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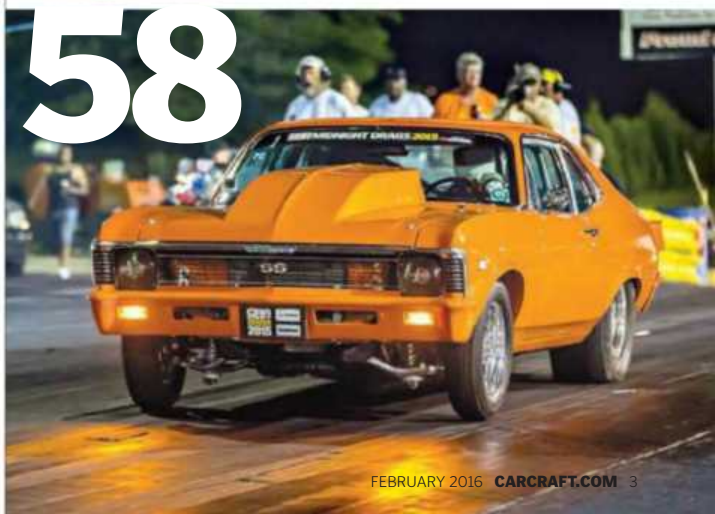
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SHOP TALK



Hey, that doesn't look like a V8!

THE MENTAL BARRIER

We all have it—something we've somehow come to believe is hard to do or above one's skills. For me, it used to be modifying transmissions. I overcame that phobia years ago when I laid all the valvebody components from a TH700-R4 on a bench and traced all the fluid circuits with a factory service manual. I completely rebuilt that old four-speed slushbox, added a shift kit, and the thing ran great when I reinstalled it in my car. In the years since, I plowed through similar barriers. I learned how to weld, paint, and do bodywork, and I successfully tackled a rebuild of the overhead-cam engine in my Crown Victoria with its mile-long timing chains.

Just a few weeks ago, I crossed another of those mental barriers off my list: the timing belt on my Subaru. OK, I know it's not very cool, but this 1999 Legacy station wagon is the only new car I've ever owned. I bought it from Ganley Subaru in Lakewood, Ohio, for purely pragmatic reasons; I wanted something with four-wheel drive and a manual-transmission. Four-wheel drive to navigate the snowy, Cleveland winters, and a manual transmission

because it's fun.

At the time, there were few cars I could afford that met my criteria. After a lot of shopping around, I found myself the proud owner of the Soob, and it has served me well over the years, requiring little more than basic maintenance in return. It hauled me from Ohio to California, when I moved here for my internship at *Motor Trend*. It's taken me all over California, Nevada, and Arizona for a variety of events and photo shoots, and I've carried nearly every part I've installed on a **Car Craft** project car—from 454 engine blocks, to a B-body 10-bolt rear axle. I've grown very fond of the car and can't bring myself to replace it.

It's an easy car to work on, too, but the one job I've consistently farmed out was the timing belt, which is supposed to be replaced every 100,000 miles. I've been through two so far, and the job isn't cheap. I let myself get psyched out by online accounts of needing expensive, special cam tools and how confusing the job is. To be fair, it can be intimidating because this is an interference engine: if the cam timing is wrong, the intake and exhaust valves will strike

each other and can even hit the tops of the pistons. At best, you'll bend the valves and the worst-case scenario will be rebuilding the entire engine.

Recently, the timing-belt tensioner failed. I couldn't afford to have it replaced this time, so I had no choice but to do it myself. Again, it turned out that the best source of information was the factory service manual. With it as a guide, I knocked the job out quickly, easily, and with little stress.

What's the point? Well, I want to hear from you readers about what kinds of barricades you've encountered and how you got past them, even if the job was as simple as an oil change. Everyone has to start somewhere, right? Email your stories of accomplishment to CarCraft@CarCraft.com. We'll compile the best ones into an article of epic heroism in a few months.

—John McGann

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SWAPPING GROUNDS

By Tommy Lee Byrd / Photos: Tommy Lee Byrd



See All the Action From the **Car Craft** **Engine Swap Challenge at Holley LS Fest**

When the Holley LS Fest got its start in 2010, the event saw great success, and it was due in part to the number of LS-swapped vehicles on the grounds at historic Beech Bend Raceway Park in Bowling Green, Kentucky. While there were many vehicles that were originally equipped with LS-based engines, the really interesting stuff consisted of

muscle cars, non-GM vehicles, and off-the-wall builds with LS engines under the hood. The popularity of LS-swapped vehicles encouraged the event organizers to create a competition to see who could perform an LS swap the quickest. The result was the **Car Craft** Engine Swap Challenge, and it has always been an entertaining part of the Holley LS Fest event.

This year, the Engine Swap Challenge vehicle of choice was a 1973–1987 Chevy C10 pickup, as these trucks are continuing to gain in popularity. It also helps that many of Holley's line of Hooker engine-swap components are a direct fit for these trucks.

The idea is to drive the truck to the competition with a tired, old small-block and drive away with a fresh LS



Team Alabama is made up of Richard Wiley (*left*) and Mark Burch Jr., who came prepared with a number of LS swaps under their belt, including a recent swap in a square-body truck like the one in the challenge.



Team Alabama came to LS Fest with this super-clean C10, which has a few engine modifications and a 700R4 transmission. Note that the cooling and power-steering systems have been removed as part of the pre-disassembly process.



engine between the framerails. The rules are simple, but the job isn't easy—each two-person team must remove the old engine and transmission and then install the new, supplied, 5.3L, LS-based engine mated to a GM 4L60E automatic transmission. The team who gets the truck running first isn't necessarily the winner—it's the team that finishes first *and* makes the testdrive successfully. Believe us when we say that the testdrive has been the determining factor for several of these engine-swap competitions.

When both teams finished the swap, it was time to take a breather and then install the cooling system, including an aluminum LS-swap radiator from Holley's new line of Frostbite cooling components. The direct-fit radiators went into place easily and then the front sheetmetal was reinstalled, while the judges inspected the swaps and tallied



Team Kentucky, on the other hand, had never performed an LS swap in any vehicle, but had a few more years of general automotive experience. Sebastian Poole of Franklin, Kentucky (*left*), and Todd Brannan of Bowling Green made up Team Kentucky.



The Team Kentucky C10 was a solid daily driver with a bone-stock, 350ci small-block under the hood. The mild drop and 20-inch wheels are a nice touch, but this C10 will be a lot meaner with an LS engine between the framerails.



Hooker LS engine-swap brackets were preinstalled on the 5.3L LS engines and offer a direct bolt-in swap for stock small-block clamshell mounts. The brackets are steel construction with zinc plating.

the scores. Team Kentucky won the battle, with an elapsed time of 1:15.16, while the Alabama boys finished in 1:22.26. Both trucks successfully made the testdrive and came back to the swapping grounds to declare the winner. In addition to the bragging rights, the winners got to keep the LS engine and overdrive transmission, which is a



As soon as the clock struck 10 a.m., the teams went to work. Both two-man teams tackled the engine swap in different manners, but most of the time was spent with one crewmember handling undercarriage work, while the other worked up top.

huge prize for any gearhead! Team Kentucky claimed they had never performed an LS swap, but their lack of experience was resolved with the bolt-on products from Hooker and the plug-and-play simplicity of the Holley Dominator EFI system. In case you haven't heard, LS swaps are easy—what's taking you so long?



Underneath, it was a matter of removing the driveshaft, transmission mount, transmission crossmember, exhaust system, and shift linkage before the old engine and transmission could be pulled out.



Team Kentucky was the first to remove their old engine and transmission combo, using the yank-and-tug method until it was finally free and clear of the truck.



Using a little more caution, Team Alabama smoothly removed the old small-block and 700R4 combo. At this point, Team Alabama was behind by just a few minutes.

When it came time to stab the LS engine and 4L60E transmission into the C10, Team Alabama quickly gained ground on the Kentucky boys.



Sebastian Poole is underneath the Team Kentucky truck and quickly jacks the transmission into place and zips the bolts into the transmission crossmember. It's important to note that power tools are not used in the Car Craft Engine Swap Challenge.

On the Alabama side, Mark Burch installed the Holley Dominator EFI intake manifold. While the self-learning EFI setup is a simple system to install, it was tough to operate under pressure and make sure the truck's wiring harness sent the appropriate amount of juice to the system.

Up top, Todd Brannan of Team Kentucky, checks for clearance as he drops the LS engine into place. A couple of bolts in the motor mounts would keep it from going anywhere, while the transmission and new crossmember were bolted into place.



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Team Alabama's Richard Wiley buttons up the transmission installation, using the Hooker transmission crossmember to mount the 4L60E transmission. We typically wouldn't suggest lifting a transmission by jacking directly on the pan, but when you're in a hurry, those little details go out the window.



Both teams were supplied with a premade driveshaft for the engine and transmission swap, but Team Kentucky ran into a problem that cost them a few minutes on the clock. The Kentucky boys resolved it with a few delicate blows with a hammer.



Team Alabama had a commanding lead in the competition, and the crowd roared as they were the first to fire the fresh LS engine. However, they couldn't get it to shut off, which meant a faulty lead source for the Holley Dominator EFI control box. It was time to thrash to find a solution, but the clock was ticking.



Despite the driveshaft issues, Team Kentucky pushed forward, and Todd wired up the Holley Dominator EFI system and set the fuel pressure to prepare to fire the engine. After a few revolutions, the engine came to life, while Team Alabama continued to thrash.



The clocks stopped long enough for the teams to install the cooling system, which consists of Frostbite direct-fit radiators, a brand-new line of LS-swap aluminum radiators from the Holley group. The teams were then back on the clock to finish up last-minute things.



Team Alabama finished the **Car Craft Engine Swap Challenge** in 1:22.26, and the result is a clean installation in their slick C10. An LS engine swap in less than 90 minutes? Yes, it can be done.



Although Team Kentucky's wiring and overall appearance isn't going to win any awards, their efforts did win the **Car Craft Engine Swap Challenge** with an impressive time of 1:15.16.

The winner was not awarded until the trucks made a testdrive through the pits at LS Fest to make sure there were no leaks or catastrophic failures. Both trucks survived the testdrive, making Team Kentucky the winner of the 2015 **Car Craft Engine Swap Challenge** at Holley LS Fest. 🏆



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Mike Tyrol / Mansfield, MA

In mid-1969, Chrysler released what many considered the best all-around street machine ever. This was a basic, budget B-body with a big stick. Until the release of the 440 Six Pack cars, the Road Runner and Super Bee could be had with the 383/335hp engine or ol' King Kong himself, the Hemi. The new 440 six-barrel engine was the third engine offered for the street set and featured triple Holleys, a beefed-up bottom end, and a nasty body package that used a lift-off fiberglass hood and police-issue 15-inch wheels. When Mike Tyrol wanted to own a similar machine, he stepped up to award-winning Mike Mancini and the crew at American Muscle Car Restorations in North Kingstown, Rhode Island (AMCRe1.com) for the effort. Rather than that RB block of yore, the Mikes agreed that the conversion of his 1969 Satellite would look old school but be all-new under the shell. So Arrington Racing was called on to build a 440-cid package around a gen-three Hemi block, which is backed by a six-speed TKO-600 crash-box and a custom-built 3.54:1 Dana 60 rear end. AMCR also did little things to make it look like it might have had the beeper just left a dealership in the summer of 1969, but there is no doubt this is iron for the 21st century.

By Geoff Stunkard / Photo: Geoff Stunkard

INTAKE AND INJECTION

Indy Cylinder Head makes the Mod Man, a cool, convertible intake manifold that can be had for a number of carb layouts—in this case, a complete, progressive, six-barrel EFI Intake system came from F&B Performance Engineered Products (FBthrottleBodies.com) fully assembled with three billet throttle-bodies, adjustable linkage, fuel rails with billet mounts, IAC, TPS, AN-8 fuel rail cross-over (AN-8), billet throttle cable mount, and air cleaner. Just bolt it on, tune it up, and go.



VALVE COVERS

While not quite the same as the big orange monster covers found on the 1969 440 Mopar engines, the custom-milled coil covers received a CNC recreation of the decal that Plymouth originally put on the hoodcoop.

UNDERHOOD HARDWARE

In addition to the March pulley, Mike added custom hood hinges that they CNC'd in-house, a Wilwood brake system with dual master cylinder, a radiator from PRC, and something no original 1969 would have had: air conditioning from Classic Auto Air.

HEADERS

The TTI headers are ceramic-coated, feeding into 3-inch pipes with an X-crossover and Dynomax Super Turbo mufflers.

LONG-BLOCK AND HEADS

Arrington (ShopHemi.com) offers this 440ci powerplant as a crate engine. Starting with a NASCAR-grade 6.1L block, the bottom end gets a 4340-grade forged K-1 crank and rods, 11.3:1 compression Mahle pistons, ARP bolts, Clevite 77 bearings, and a Melling pump. The cam is one Arrington has designed for this package (#648) and the heads are given their Stage 4 treatment, which includes 2.07-inch intake and 1.57-inch exhaust valves. A billet pulley system from March finishes it off. With the accompanying injection setup, the motor peaked at 600.1 hp on the dyno in North Carolina before being shipped north to AMCR.



THE CAR

Mancini admits he built this car twice, fitting everything together first while in primer and then, after all the mount locations were located and made, taking the Plymouth into the paint booth and then reassembling it. It won both a Gold Award and the Judge's Platinum Pick at its debut at the Muscle Car and Corvette Nationals in November 2015, and was the first non-stock resto project the shop has taken on.

SPEED PARTS

BIG NEWS FOR MOPAR FANS

What it is: New cylinder heads for Chrysler B and RB engines.

Why you care: Trick Flow has just brought its newest cylinder head to market, and it opens up a new market to them. Trick Flow has long produced high-quality cylinder heads for Ford and Chevrolet, and this is the company's first foray in the Mopar market, one that's ripe for a new player. The Power Port 240 specs promise the potential for impressive power. The 240cc intake/70cc exhaust runners and 78cc combustion chambers are CNC-profiled for equal flow port-to-port and efficient airflow through the cylinders. They are assembled with quality components like PAC Racing valvesprings, stainless 2.190-inch intake/1.760-inch exhaust valves, and bronze alloy valve guides. Oiling passages have been improved over stock and the rocker stands are much stronger than stock. Look for a comprehensive test of these heads soon.



How much:

Pricing starts at \$989.50. These heads are fully assembled and sold individually.

Learn more: Trick Flow Specialties; 330/630-1555; TrickFlow.com



WIRES FOR CHEVELLES

What it is: A complete wiring harness for 1968 and 1969 Chevelles.

Why you care: Wiring problems can quickly become a nightmare. Skip the hassle by installing a direct-fit wiring harness from Painless Performance. Now available for 1968 and 1969 Chevelles, Painless is expanding its product lineup to encompass more of our favorite muscle cars. Most of the connectors have been pre-installed, and the harness is designed to follow the factory routing, so the job is basically out with the old and in with the new.

How much: \$798.95

Learn more: Painless Performance; 817/244-6212; PainlessPerformance.com



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What it is: A bolt-in custom dash panel for 1987-1993 Mustangs by Classic Dash.

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How much: \$159.95 without gauges.

Learn more: Classic Dash; 775/883-7904; ClassicDash.com

OIL INJECTION

What it is: An engine pre-luber from Summit Racing.

Why you care: It's practically a ritual: pre-lubing an engine you just rebuilt prior to starting it for the first time. It's a good practice, too, because it gets engine oil to all the critical bearing surfaces, plus it's a great way to make sure you don't have any leaks before dropping the engine into the car. The problem with many newer engines is that the oil pump is driven directly off the crankshaft, and there's no way to spin it independently without starting the engine. This forces you to either start the engine as-assembled with just break-in lube on the bearing surfaces or come with some other contraption to pump oil into the engine. Summit Racing offers an easy

solution: this pressurized pre-luber. Attach the hose to an oil gallery plug on the block, add oil to the tank, and pressurize it with compressed air. When you open the valve, air pressure pumps the oil into the engine, priming the bearing surfaces.

How much: \$159.97

Learn more: Summit Racing Equipment; 800/230-3030; SummitRacing.com



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FORD AXLE RETRO-LOOK MAKEOVER

Exploring Currie Enterprises' New Resto-Correct Mustang 9-Inch Rear End

By Steve Magnante / Photos: John McGann

→ There was a time long ago when you had to hit the junkyard if you needed the strength, reliability, and easy gear-changing convenience of a Ford 9-inch rear axle. They were dark days, indeed. But in the past 20 years, Currie Enterprises has emerged as one of a handful of outfits capable of creating brand-new 9-inchers from scratch.

Early on, like the rest of us, the Currie team used to hit the boneyards, hoarding serviceable axles from the thousands of pre-1986 Ford vans, light trucks, and pre-1980 fullsize Ford passenger cars, but as supplies dried up, they realized it was time to either find

another hobby or step up and reproduce the highly desirable third members themselves.

It's been a long time since Currie Enterprises invested in the necessary metal-forming dies and foundry patterns, but it has paid off all the way around. They get to keep building axles (and no longer have to hassle with the grief of reconditioning rusty, grimy used stuff) and we get a limitless supply of custom-built 9-inch axles to suit virtually any application and horsepower level. Speaking of which, beyond the resto-themed, stamped steel housing shown here, Currie also offers a 206T6 cast-aluminum

housing and a completely fabricated welded steel housing for use with massive power.

Watch as we cover the assembly of a restoration-style, hump-back 1967–1970 Mustang 9-inch housing with factory-appearing tapered axletubes. Unlike the more generic-looking stampings and heavy-handed constant-diameter tubes found on many crate axles, this one's got some subtle charm. It looks stock, but isn't. Destined to serve beneath a mid-1960s Mustang, the customer doesn't want the fortified axle to stand out too much at the burger joint. They don't need to know it's actually good for 600 hp.





Currie offers stamped steel differential housings in several shapes: the 1967-1970 Mustang Replica (as shown) with a pronounced ring-gear hump, Centurian (similar to a stock 1978-and-later Ford Bronco), and Hot Rod with a smooth, round face. Note how the seamless, 0.188-inch wall thickness DOM steel axletubes are wedged down from 3.00 to 2.75 inches, just like Ford did it on Mustang axles. Our billet steel bearing ends accept small (2.834-inch OD) bearings; big (3.150-inch) bearing ends are also available.



Joining the tubes to the housing requires precise work. To keep everything aligned, a dummy centersection is installed and a precision-ground, arrow-straight steel bar simulates the axleshafts. This union is much stronger than the butt-welded approach taken by Ford half a century ago.



On a stock 1967-1970 9-inch housing, the tubes are cut so they measure 17.438 and 18.813 inches (driver/passenger) to deliver a 54.325-inch total housing width. This is no place for a wobbly chop saw. Currie's precision bandsaw ensures accuracy.



Since Currie builds thousands of axles every year, a series of automated rotisserie fixtures have evolved to help the welders do their best work.



With the bearing ends and tubes permanently mated to the center housing, the leaf-spring pads are next. They're set to drop onto the stock Mustang mounting pins, which are 43 inches apart. The pads also replicate the Mustang's 2.5-degree nose-up pinion angle.



Each 3-inch OD axletube fits over precise barbs formed onto each end of the housing. The 2 3/4-inch tubes allowed Ford to use the same axle U-bolts and shock-absorber mounting plates on Mustangs built with the smaller 6.75- and 8.00-inch rear axles. This streamlined the assembly process. What worked for Ford then works for you now. Your existing 2.75-inch U-bolts and matching plates can stay put.



At the outboard ends, pilot bushings work with the alignment jig to maintain concentricity of the axletube bearing ends. The red aerosol can is Harris nozzle shield anti-spatter spray. It supports Currie's claim: "The only thing we don't duplicate are Ford's ugly factory welds."



Before final welds join the tubes and bearing ends to the raw housing, bubble levels are used to confirm alignment. Mistakes here would affect pinion angle and brake backing plate/caliper orientation.



The spring pads are in place, but with all the heating, the alignment fixture reveals inevitable housing distortion (note the gap at the 10 o'clock location). This is normal, but must be corrected.



A hydraulic press counteracts the distortion and restores housing alignment. When completed, the fixture slips in and out of the tubes by hand.

Like an engine or transmission, axles need to be vented so heated air escapes. Non-vented axle housings can force pressurized gear lube onto the brakes and past the pinion seal. Here, threads are cut into a hole drilled into the driver-side tube. A drill jig ensures the hole goes in the standard Mustang location.

Currie manufactures its own forged axleshafts from alloys suited to the particular application. In-house spline-cutting equipment is used for quality control. Our axles are standard 28-spline units made from heat-treated 1541 alloy and are significantly stronger than stock. Stronger 31- and 35-spline upgrades are available.

Numerous wheel-stud size, thread type, and bolt-pattern options are offered, right up to 6-on-5½ for light trucks. We went for the basic 5-on-4.5 Mustang pattern with ½-inch stock-length studs. Here a hydraulic press makes short work of stud installation.

After the studs go in, the bearings and retainer plates are next. At ¼-inch thick, the Currie retainer plates won't deform like the pressed steel stockers. On this stock-dimension 1967-1970 Mustang replica, the axles measure 27.125 and 31.125 inches (driver/passenger).





With the carrier bearings pressed in place, the ring-gear bolts are torqued to 65 lb-ft. Don't forget to apply high-strength thread-locking compound. Brian Shephard from Currie says, "Most home builders miss this. You must use Loc-Tite on the ring-gear bolts. If you don't, they'll loosen up and shear." Unlike some axle types, the 9-inch takes normal right-hand threaded fasteners

After the ring gear is installed into the case, initial pinion-depth measurements can be taken—and adjusted with various pinion-depth shims—to arrive at the proper gear mesh. The Currie 9-Plus pinion support is an improved copy of the iconic Ford Daytona unit from 1966. A key difference is that it's made from 65,000-psi nodular iron, a superior alloy. The large N cast into the Currie 9-Plus case tells us it's cast from the same 65,000-psi nodular iron as the pinion support. It's good for 600 hp.



Two trial assemblies were all it took before the ideal gear-mesh pattern resulted. Gone are the old days of refurbishing used parts. All of this is brand new and just a phone call away.



New axle seals are driven into each housing end. They're essential to safe brake function. When properly filled with gear lube, there is a constant bed of liquid on the bottom of each tube. Without seals, it will surge toward the outside wheel when cornering and contaminate the brakes.

A constant bead of RTV is applied to both sides of the housing gasket. Resist the temptation to leave one side dry, thinking it'll stick to one side (or the other) and you can reuse the gasket later. These gaskets invariably tear during disassembly.



Currie ships all axles with Nylock nuts and washers securing the centersection to the housing. The yoke is a new item (PN 4042-LD) that combines big bearing (9-Plus/Daytona-type) bearing retainer compatibility with Mustang-sized 1310 U-joints. It's also made of 65,000-psi nodular iron. Currie also offers yokes for 1330 and 1350 U-bolt applications.



A light coat of Valvoline or similar grease aids assembly. Our 28-spline axles measure 1.210 inches in diameter. Spline count impacts axle strength simply because more splines require a larger-diameter shaft upon which to exist. Generally, the larger the axle shaft diameter, the greater its strength. For comparison, 31-spline axles (as used in factory 428 and Boss Mustang applications) measure 1.325 inches and aftermarket 35-spline axles measure 1.50 inches.



Though the brakes are not installed yet, they'll later be trapped between the housing flange and retainer plate. Currie sells complete disc- and drum-brake kits or you can reuse your existing brakes. When ordering, be sure to specify what type of brakes you're using so you get axles with the proper bearing-to-flange distance.

→SOURCE

Currie Enterprises; 888/338-7502;
CurrieEnterprises.com

ASK ANYTHING



Like the 1958–1961 Chevy 348, 1966 Olds W-30, and 1964–1966 Tri-Power GTO, the 1957–1958 Olds J-2 relied on two end-mounted Rochester 2G and a central 2GC (choke equipped) two-barrel carburetors to boost horsepower—and image.

CARBURETOR FLOW RATING

Dana Shifflett; via Facebook: Why is a four-barrel carburetor flow measured at 1.5 inch of mercury, while all other carbs are measured at 3 inches? For comparisons, what's a good conversion factor?

Steve Magnante: Good question, Dana, and one that's made many triple two-barrel induction systems look better than they really are in terms of absolute cfm capacity at wide-open throttle (where advertised cfm ratings are taken). The root of your question comes down to the fact that one- and two-barrel carburetors were in use by the auto industry for several decades before the one-piece, unitized four-bar-

rel first arrived in the 1950s.

In his 1983 book, *"Super Tuning and Modifying Carter Carburetors (S-A Design)"*, author Dave Emanuel sheds more light: "...since they agree on little else, most carburetor manufacturers have standardized on: 1) 3.0-in/Hg (in/Hg: inches of mercury) as the pressure drop at which two-barrel carburetors are rated and; 2) 1.5-in/Hg as the pressure drop at which four-barrel carburetors are rated. Since airflow increases as the pressure drop is raised (in a non-linear fashion; doubling the pressure drop produces less than double the flow)...in theory it is assumed that at wide-open throttle a conventional passenger-car engine will never realize

an intake manifold vacuum higher than 1.5-in/Hg when equipped with a four-barrel, nor more than 3.0-in/Hg when fitted with a one- or two-barrel." Emanuel then offers this conversion formula: Flow at 1.5-inch/Hg = carburetor cfm rating at 3.0 inches/Hg divided by 1.414.

Putting it into action, let's take the 1,350-cfm rated flow of the triple Holley 2300-series two-barrels installed on engines like the Mopar 440 Six Pack and Corvette 427 Tri-Carb and divide it by 1.414. We get 954 cfm, the system's flow potential when measured by the standard used for rating four-barrel carburetors.

The first mass-produced American four-barrel was unveiled by Carter in



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1952 and called the WCFB (Will Carter Four Barrel). Interestingly, Buick was first to use it: on the 1952 Roadmaster straight-eight. For this one year, Buick's huge 320-inch Fireball eight breathed through a single WCFB four-barrel. The 1953 arrival of Buick's fabled "nailhead" OHV V8 put an end to this odd pairing of pre- and post-war technologies.

Like dominoes, all of Detroit quickly discovered the efficient packaging, easy tuning, cost effectiveness, and power of the single four-barrel carburetor and installed them atop their medium- and top-performing V8 powerplants—sometimes *two* four-barrels were used, like on the 1955 Chrysler C300 and 1956 Chevy Corvette (of which 90 percent were dual-quad-equipped).

Here's a general rundown of when carmakers and their customers discovered the thrill of the four-barrel: Buick, Cadillac, and Oldsmobile in 1952; Lincoln in 1953; Mercury in 1954; Chrysler and DeSoto in 1954; Dodge and Plymouth in 1955; Ford in 1955; Chevrolet in 1955; Pontiac in 1955; Studebaker in 1955; Hudson in 1957 (on a Packard-sourced V8); and Nash/Rambler in 1957. Of note was Packard's 1953 decision to follow Buick's lead by feeding its massive 327- and 359ci (in 1954) flathead straight-eights with the new WCFB single four-barrel. Mounted between the number 4 and 5 cylinders, it was an engineering challenge to juggle jetting so the outboard cylinders, which were nearly 2 feet away from the carburetor, didn't run lean while the adjacent cylinders (mere inches from the carburetor) weren't too rich. But they did it.

The 1955 arrival of Packard's home-brewed 320, 352, and 374-cube V8 engine family saw the immediate termination of all inline Packard engines. By the way, Packard's use of big, 5-inch bore centers (shared only by Cadillac's 472/500 V8 family) hints that much larger engines were planned had Packard survived beyond 1958. Unfortunately, it was not to be.

There is more to the two- and four-barrel carburetor cfm flow

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rating game, but Emanuel summed it up: "Obviously, carburetor airflow ratings are not intended as absolutes, rather they are relative guidelines. Depending on engine displacement and volumetric efficiency, airflow may exceed or fall below the rated capacity of a particular carburetor. In most instances, the manufacturer's rating will be a very usable approximation, so it really doesn't pay to become entangled in long calculations involving venturi shapes and airflow peculiarities, even if you do have the latest model electronic calculator." 'Nuff said!

JUICE LIFTER LASH CHECK

Chuck Reynolds; via

CarCraft.com; I'm putting together a plan for the build of my big-block 427 for my 1969 Corvette and came up with a couple of questions concerning pushrod length and valve-to-piston clearance. I plan to use rockers with roller tips and want to check the contact area on the end of the valve. With hydraulic lifters, do they need to be full of oil to check the contact area? The same general question also for the piston-to-valve clearance, do the lifters need to be full of oil? Does the oil system need to be pressurized or do the lifters just need to be full of oil? Thanks from a longtime reader.

Steve Magnante: Chuck, your instincts are correct—the compressible nature of a dormant hydraulic lifter complicates the task of checking roller-to-valve-tip contact patterns as well as piston-to-valve clearance dimensions. This is all because the non-running engine doesn't produce the approximate minimum of 15 psi oil pressure required to fill the lifter body and keep it from collapsing if the crankshaft (and oil-pump drive) aren't in motion. And while it is possible to pre-fill hydraulic lifters during engine assembly by submerging them in an oil can and manually



Power & Precision



The basic criteria for Goodguys' Street Machine of the Year award is fairly simple; it's presented to the 1954 through 1972 car that best exemplified "masterful build quality with extreme performance." The 2015 winner, Sonny & Debbie Freeman's "Revelation" 1967 Corvette built by Mike Goldman Customs, certainly fits the bill. It's fast, handles well, and the workmanship is beyond reproach.

Inside the gorgeous 'Vette's potent 427 c.i.d. LS3 engine built by Mast Motorsports you'll find a wide array of ARP fasteners employed to ensure optimum performance and reliability. Goldman also used them for various other functions. Says Mike "I really love the 12-point design as it compliments many components."

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cycling the inner workings by hand with a pushrod, the prime is temporary and won't last the amount of time needed to do the testing.

Your solution is to substitute a solid lifter (of the same type as your cam, flat or roller) temporarily during the tests. Be sure everything is clean so you don't pollute the fresh engine and also smear plenty of cam lube on the heel of the lifter to prevent scuffs. Light engine oil will suffice with roller-type lifters.

Your engine combination sounds like a pretty basic recipe using stock-type components with no handmade, high-end stuff to complicate things. Happily, when it comes to aftermarket cams, lifters, and rocker arms, the majority of name-brand manufacturers have taken pains to ensure that the critical dimensions of their high-performance replacement parts share critical dimensions with the standard-issue, OE-style components they're replacing.

The upshot is you don't have to worry that you're reinventing the wheel. This philosophy greatly simplifies the upgrading process, making it more appealing to backyard guys like us who don't have access to the machinery needed when building true, from-scratch custom engines. And thanks to the inherent power-producing nature of the Chevy 427, there's no need to deviate very far from the production configuration to get impressive gains.

As such, the critical working height of most commonly available aftermarket lifters (as measured from the cam contact face to the cup where the pushrod sits) is the same regardless of whether a solid or hydraulic cam is being used. This happily negates the need for specific-

length pushrods for solid or hydraulic cams. That said, remember that the Chevy big-block intake pushrods are shorter than the exhaust pushrods (8.275 versus 9.250 inches). You knew that, right? But if you're running a roller cam, check with its manufacturer to assure proper pushrod length just in case.

Also, I'm assuming that your block and heads have not been decked or machine-cut more than the typical five- to ten-thousandths of an inch employed to clean up mating surfaces. If your block and/or heads have been severely cut, you'll need to determine how much, then compensate with custom-length pushrods to restore proper geometry and function. Likewise, truck-sourced 427 blocks and the recent breed of GMPP 572 crate engines use tall deck heights that take longer pushrods (and wider intake manifolds), so beware.

As for valve-to-piston clearance, I'm assuming your street and strip 427 is running normal steel connecting rods and nothing exotic like aluminum. Also, you didn't mention your compression ratio, but I'll assume you've got something around 10.5:1 maximum. I'd suggest a minimum of 0.080 (intake) and 0.100 (exhaust).

On the matter of checking the range of movement as the roller rocker moves about the valve tip, the temporary solid lifter will replicate the behavior of pumped lifters on a running engine, but remember to set the rocker-arm adjusters to zero lash. This is the closest you'll get to recreating the slight amount of plunger preload inherent in the hydraulic lifters you're running.

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THIS GUY'S GARAGE



The 1955 Bel Air sedan is an original patina-paint car that belonged to a buddy who is very much into Tri-Five Chevys. It was a rotisserie resto with an updated suspension. Instead of the stock 265 V8, it now has a Duntov-cammed 283 and the original cast-iron Powerglide.

That's an original L79, four-speed 1966 Nova. For those not familiar with the RPO code, L79 in the Chevy II was a 350hp 327 small-block with 11.0:1 compression, a unique dual-snorkel air cleaner, and a four-speed. The car's weak link was the stock mono-leaf rear suspension, but fitted with traction bars, it was very quick. Bill "Grumpy" Jenkins did very well with one back in the day*.

STEVE FAIST / Ventura, CA

It's not too surprising when a guy whose grandfather collected old cars—including a huge assemblage of Bantams—and had a drag-racing father, that Steve Faist's little shop of wonders would be so cool. What we found intriguing was the wide variety of stuff in his shop. Yes, OK, these are all Chevrolets (except for the Willys), but it's a little bit of everything from the Bow Tie muscle-car era. This may look like a rich guy's garage, but Steve is a self-made man who does most, if not all, of the work on all these cars himself. His grandfather recently passed away, and he's currently restoring his granddad's shop, which appears to us to be a lifetime project! Steve's a driven guy, though. He'll probably have it completed in less than a year and then be back to his own projects, which are way too numerous to mention here.

By Jeff Smith / Photo: Jeff Smith

Steve really likes his 1941 Willys. Yes, it's a fiberglass car, and no, he didn't build it. A shop in Seattle originally built it, and Steve bought it because he's always liked this cool gasser body style. It's a driver with a Ramjet 350, 700R4, and a 9-inch with a four-bar and coilovers, and Steve says it's the most comfortable hot rod he's ever driven—even with the fat rear tires.

The 1969 El Camino was Steve's dad's daily driver that he bought in 1970: "I drove this car as a kid. It's got a goofy color, but everybody around Ventura knew this was my dad's car." It has a 325hp 396 Rat with a TH 400 and a 12-bolt. The license plate says "PNUTBTR," referencing its color.

The 1962 is not an original 409 car, but the engine is date-coded correct as a dual-quad 409 with a mechanical roller cam. The car has been tweaked with a 9-inch out back, four-wheel disc brakes, and a four-speed. "This was a horse-trade deal I couldn't pass up," Steve says.

This 1966 big-block El Camino is a nice Powerglide, factory A/C car that Steve bought from one of his many pals. It's a 325hp 396 with American Racing T70s that he says he doesn't drive nearly enough.



Steve's grandfather made much of his living with oceangoing ships, while Steve gravitated more toward the freshwater variety—with blowers! This is one of the last of the Cole flat-bottom boats that Steve also horse-traded with a guy back East, sans engine. It still has its original Gary Baca paint job and Steve Stanford pinstriping. The engine is a 468 big-block with a Blower Shop high-helix 14-71 that runs on gasoline.

*The very first Grump's Toy was a 1966 L79 Nova that placed it in NHRA A/Stock in 1966 and was paired many times against Jere Stahl's Hemi Belvedere. The Hemi won more than its fair share of races that year against Jenkins. The most famous was their final-round Top Stock Eliminator pairing at the 1966 U.S. Nationals at Indy when Stahl took the win light over Jenkins in the final round after Jenkins red-lighted. Even with the loss, this cemented the L79's legend for life.

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SUPER COUPON

MICROFIBER CLEANING CLOTHS PACK OF 4

LOT 68440
69678 shown

SAVE 64%

\$1.99 comp at \$5.55

Customer Rating **★★★★★**

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SUPER COUPON

VEHICLE POSITIONING WHEEL DOLLY

LOT 61917 shown
67267/62234

SAVE \$200

\$69.99 comp at \$269.99

Customer Rating **★★★★★**

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SUPER COUPON

CENTRAL PNEUMATIC HIGH SPEED METAL SAW

LOT 62541/60568/91753 shown

SAVE 74%

\$12.99 comp at \$49.99

Customer Rating **★★★★★**

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SUPER COUPON

40 LB. CAPACITY FLOOR BLAST CABINET

LOT 62144
68893 shown

SAVE \$170

\$179.99 comp at \$349.99

Customer Rating **★★★★★**

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SUPER COUPON

3/8" x 50 FT. HEAVY DUTY PREMIUM RUBBER AIR HOSE

LOT 69580 shown
61939/62250

SAVE 33%

\$19.99 comp at \$29.98

Customer Rating **★★★★★**

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WOW SUPER COUPON

PITTSBURGH RAPID PUMP® 3 TON LOW PROFILE HEAVY DUTY STEEL FLOOR JACK

LOT 68049/62326
62670/61253
61282 shown

SAVE \$85

\$84.99 comp at \$169.99

Customer Rating **★★★★★**

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WOW SUPER COUPON

6500 PEAK/5500 RUNNING WATTS 13 HP (420 CC) GAS GENERATORS

LOT 68529/69672 shown

SAVE \$229

\$459.99 comp at \$689

Customer Rating **★★★★★**

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WOW SUPER COUPON

26", 4 DRAWER TOOL CART

LOT 95659 shown
61634/61952

SAVE \$250

\$99.99 comp at \$349.99

Customer Rating **★★★★★**

77872110

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SUPER COUPON

CENTRAL PNEUMATIC 20 OZ. GRAVITY FEED SPRAY GUN

LOT 47016 shown
67181/62300

SAVE 80%

\$9.99 comp at \$49.98

Customer Rating **★★★★★**

77888938

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SUPER COUPON

PITTSBURGH 6 TON HEAVY DUTY STEEL JACK STANDS

LOT 69596
61197/62393
38847 shown

SAVE 50%

\$39.99 comp at \$79.99

Customer Rating **★★★★★**

77902322

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SUPER COUPON

29 PIECE TITANIUM NITRIDE COATED HIGH SPEED STEEL DRILL BIT SET

LOT 61637 shown
5889/62281

SAVE 76%

\$13.99 comp at \$59.97

Customer Rating **★★★★★**

77877575

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SUPER COUPON

POWDER-FREE NITRILE GLOVES PACK OF 100

Item 68498 shown

SAVE 59%

\$7.99 comp at \$14.97

Customer Rating **★★★★★**

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SUPER COUPON

4 PIECE ANTI-FATIGUE FOAM MAT SET

LOT 61607
62389
94635 shown

SAVE 61%

\$6.99 comp at \$17.97

Customer Rating **★★★★★**

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SUPER COUPON

20 TON SHOP PRESS

LOT 32879
60603 shown

SAVE \$215

\$154.99 comp at \$369.99

Customer Rating **★★★★★**

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SUPER COUPON

PITTSBURGH 4" MAGNETIC PARTS HOLDER

LOT 62535
90568 shown

SAVE 66%

\$1.99 comp at \$5.99

Customer Rating **★★★★★**

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Customer Rating ★★★★★

1.5 HP, 6 GALLON, 150 PSI PROFESSIONAL OILLESS AIR COMPRESSOR CENTRALPNEUMATIC

LOT 67696 shown
62894/68149/62380/62511

AWARD WINNING QUALITY

SAVE \$49

\$127.99 comp at \$149

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FREE

WITH ANY PURCHASE PITTSBURGH 1" x 25 FT. TAPE MEASURE

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69030/69031

\$6.99 VALUE

77993274

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WOW SUPER COUPON

2500 LB. ELECTRIC WINCH WITH WIRELESS REMOTE CONTROL

LOT 61258 shown
61840/61297/68146

\$59.99 comp at \$259.99

SAVE \$200

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DRIVE	LOT	COMP AT
1/4"	2696/61277	\$29.99
3/8"	807/61276	\$54.91
1/2"	239/62431	\$73.22

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Customer Rating ★★★★★

YOUR CHOICE Item 239 shown

\$11.99 • Accuracy within ±4%

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WOW SUPER COUPON

Customer Rating ★★★★★

ADJUSTABLE STEEL WELDING TABLE

LOT 61369

SAVE \$90

\$59.99 comp at \$149.99

77983140

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WOW SUPER COUPON

12" SLIDING COMPOUND DOUBLE-BEVEL MITER SAW WITH LASER GUIDE

Customer Rating ★★★★★

SAVE \$264

\$134.99 comp at \$399

LOT 69684 shown
61776/61969/61970

77921955

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WOW SUPER COUPON

1000 LB. CAPACITY ENGINE STAND

LOT 69886
69520 shown

SAVE 44%

\$49.99 comp at \$89.99

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WOW SUPER COUPON

20 GALLON PARTS WASHER WITH PUMP

LOT 60769/94702/7340 shown

Customer Rating ★★★★★

SAVE \$55

\$84.99 comp at \$139.99

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WOW SUPER COUPON

72" x 80" MOVER'S BLANKET

LOT 66537 shown
69505/62418

Customer Rating ★★★★★

SAVE 61%

\$6.99 comp at \$17.97

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WOW SUPER COUPON

56" 11 DRAWER INDUSTRIAL QUALITY ROLLER CABINET

LOT 69395/67681 shown

Weights 441 lbs.

3458 lb. Capacity

SAVE \$1100

\$699.99 comp at \$1799.99

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WOW SUPER COUPON

6.5 HP (212 CC) OHV HORIZONTAL SHAFT GAS ENGINES

LOT 60363/69730/68120

LOT 68121/69727 shown

CALIFORNIA ONLY

Customer Rating ★★★★★

SAVE \$228

\$99.99 comp at \$328

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WOW SUPER COUPON

12 VOLT, 10/2/50 AMP BATTERY CHARGER/ENGINE STARTER

LOT 60653 shown
66783/60581/62334

SAVE 57%

\$29.99 comp at \$69.99

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WOW SUPER COUPON

10 FT. x 20 FT. PORTABLE CAR CANOPY

LOT 60728/62858/63054
62857/69034 shown

SAVE \$79

\$119.99 comp at \$199

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WOW SUPER COUPON

1500 WATT DUAL TEMPERATURE HEAT GUN (572°/1112°)

LOT 62340/62546

Customer Rating ★★★★★

SAVE 70%

\$8.99 comp at \$29.97

77959304

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WOW SUPER COUPON

ADJUSTABLE SHADE AUTO-DARKENING WELDING HELMET

LOT 61611
46092 shown

SAVE 50%

\$39.99 comp at \$79.99

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PROJECT CAR UPDATE

What's Up With Our Cars?

By John McGann / Photos: John McGann



Truck Norris when we bought it in May 2012.

→ We've been rolling along on Project Truck Norris, our 1967 C10 pickup that has been serving as our daily driver for the last three months. As you'll recall, we picked this thing up for \$1,800 on Craigslist and almost immediately had to replace the worn-out, original 283. We dropped in an almost equally tired 350 Goodwrench engine that had a lot of dyno time on it from parts testing, so it wasn't too long before we had

that engine out for a rebuild. While the engine compartment was vacant, we took the opportunity to install a four-wheel disc brake kit from CPP, a new steering column from CPP, and new wiring harnesses from Classic Industries. The pictures show a timeline of how Truck Norris has been transformed since the day we bought it in May 2012. The second picture was taken July 30, 2012, after dropping in a Goodwrench 350 and giving ol' Truck a

primer "paint job." The white roof and grille is Rust-Oleum out of an aerosol can. The last picture shows Truck's new stance after installing CPP's 2-inch drop spindles and 3-inch drop rear coil springs. We also like the look of the 17-inch rally wheels from Wheel Vintiques and tires from Mickey Thompson, but don't like the stock dimension offset. As seen here, the wheels are installed with 1/4-inch spacers on the front and 1 1/4-inch on the rear.



CPP's disc brake conversion kit came with a massive brake booster. Because we've gotten used to the manual brakes and steering in the truck, we removed the booster and reinstalled the master cylinder using the original (non-power-assist) brake-pedal pushrod. This frees up a lot of space in the engine compartment and makes it easier to remove and install engines. We also replaced both of the underhood wiring harnesses with new ones from Classic Industries. Made by American Autowire, they are complete and ready to install.



We built a 383 out of the Goodwrench 350, mated it to the original SM420 four-speed, and dropped that combo back in the truck. At Westech, Truck Norris churned out 385 hp at the wheels, as much as the old 350 made on the engine dyno. Westech's Steve Brulé tweaked the Quick Fuel 750 carburetor, and we managed to knock down 15 mpg on the drive home. We've got a transmission change scheduled for Truck next. American Powertrain helped us out with a new Tremec T56 and their C10 swap kit. Stay tuned.

→SOURCES

American Powertrain; 931/646-4836; AmericanPowertrain.com
Classic Industries; 800/845-1280; ClassicIndustries.com
Classic Performance Products (CPP); 800/522-5004; ClassicPerform.com

Mickey Thompson; 330/928-9092; MickeyThompsonTires.com
Tremec; 734/456-3700; Tremec.com
Wheel Vintiques; 800/959-2100; WheelVintiques.com



Photos: Miles Cook

RON'S RETURN

You don't have to tax your brain cells too hard to recall Ron Burgundy, the turbocharged 1987 Mustang built by former company wrench Grant Peterson. Grant left to work on motorcycles and sold Ron to a guy named Juan Carlos Brizuela, a **CC** reader and fan of the car.

Juan is picking up where we left off, doing what we would have continued to do—add more power, of course. He had the fuel system converted to run the engine on E85, which is a good idea if he plans to turn the boost up. Eddie Rios of Addicted Motorsports did the work, re-plumbing the fuel system and swapping in the sewer-pipe fuel injectors.

As you can see in the pictures, Juan's in the middle of giving Ron a makeover. Noe Palomino of NYF Garage is giving the car a fresh respray with PPG paint in the original color. We will check back soon to see the results. After that, it's back to the dyno and the track for some horsepower numbers and timeslips.



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By Miles Cook / Photos: Miles Cook

FUN WITH A FAIRLANE

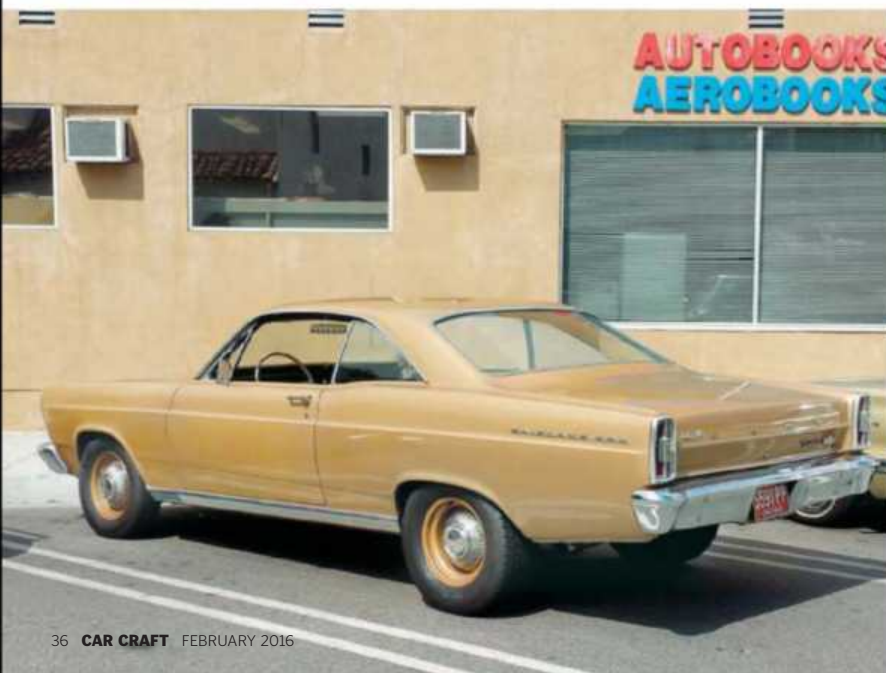
As a 20-year-ago former staff writer with **Car Craft** during the 1990s, I am excited to be back in the fold again, helping editor McGann with various **CC** tech and feature articles. In fact, when I found this super-sano 1966 Fairlane two-door hardtop on SearchTempest.com in May 2015, I had **Car Craft** front and center in my mind.

After having the seller hold the car for me with a deposit, I drove a rental car from Indianapolis to Columbus the Friday night before attending the 99th running of the Indy 500. Having owned

more than 20 Mustangs and upward of 10 Fairlanes, this car was a special find among those other cars. Originally a six-cylinder car, the Antique Bronze '66 was an ideal choice because it met my criteria. I was primarily looking for a clean, two-door hardtop body—drive-train and mechanical bits were less of a concern. However, the built 306 small-block/C4 trans drivetrain and 15-inch steel wheels with dog-dish hubcaps were the gravy, making this purchase a no-brainer.

The point of my experience here is that this car wasn't an impossible find. Good cars are still available; the best way to find them is through diligent online searches, and SearchTempest.com is a great way to start. It combs online ads according to your search criteria, and that's how I found this car, which was posted on Craigslist in Columbus, Ohio.

After getting the car shipped home to California, we decided to establish a baseline by running it on Westech Performance's SuperFlow chassis dyno, where it made 260 hp. How does that translate to track times? We will be installing a set of drag radials on it and finding out firsthand. Check back soon, as it will be interesting to see the track-test results we get. 📷



HOT ROD NETWORK

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The screenshot shows the Hot Rod Network website. At the top is a navigation bar with links for HOT ROD, ROADROLL, SCOT, JUNKYARD, STREET RODS, VIDEO, APPAR, RACING, and MUSCLE CAR. Below this is the 'HOT ROD NETWORK' logo and a search bar. A secondary navigation bar includes CARS, HOW TO, FEATURES, VIDEOS, EVENTS, and SUBSCRIBE. The main content area is divided into two columns. The left column features a 'FEATURED CARS' section with a large image of a 1933 Continental Coupe and a 'LATEST ARTICLES' section with two article previews. The right column has a 'HOT ROD TYPES' list and a 'NEWSLETTER SIGN UP' form. A 'CLICK HERE FOR A 30 DAY TEST DRIVE!' button is located at the bottom right of the main content area.

FEATURED CARS

1933 Continental Coupe - Continental Divide

How rare do you like your car? How does one of four known to exist grab you? And when you come across that unmodified, all-original and complete car, you go... [Read More](#)

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- Hot Rods
- Hot Rod Trucks
- Kit Cars
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PROJECT ZEDSLED UPDATE

Making Progress!

By Kevin Tetz / Photos: Kevin Tetz

➔ What a difference a year makes. As of September 2015, ZedSled is now a running, driving, shifting, and leaking car. We spent several weeks doing late-night thrashes and pizza binges getting vehicle systems nailed down, connected, gassed up, and functional. As with any project, the Sled was not without drama or issues on the reconstruct. When we installed a set of Hooker ceramic-coated, long-tube headers, we realized we hadn't ordered the reducer that Hooker offers from the 3-inch collector to the 2.5-inch exhaust tubes. Oops! Thanks go to a local exhaust company for whipping up some reducers in a pinch; they enabled us to get the system installed, but we've got a nasty collector leak that's

soon to be repaired. Other leaks include the rear differential cover (forgot to tighten bolts), trans-pan leak (didn't tighten bolts enough), power-steering pressure line (forgot to tighten the lines), and on start-up we had a Bellagio-style gasoline eruption at the fuel-pressure regulator (forgot to—well, you get the picture). The one leak that wasn't necessarily our fault was at the rear brake caliper flex line. The unibody was loosening the banjo bolt when the rear suspension cycled. Weird, huh? It's a good thing we found this culprit while still on the trailer. What's the good news in all of this? None of the failures were due to equipment or products, just operator error.

Our original goal was to debut ZedSled at LS fest—drive it there, flog it on

the autocross, test it on the dragstrip, and drive it back home. It was a little deflating only to be able to drive it on and off of the trailer, but we're declaring victory on this one, especially considering what she looked like at last year's LS Fest. The Sled got a ton of attention, and apparently the formerly undesirable rubber-nose F-body is now a sought-after and affordable alternative for the Pro Touring scene.

What's next for ZedSled? Dyno tuning and track testing, final detailing, and general tweaking of a fresh project. We'll tell you the truth on this one: it looks like we're going to be well within our projected \$25,000 parts estimate on ZedSled. That's not bad for a junkyard compilation of parts on a stepchild F-body.





The Painless Performance wiring was, well, painless. The "direct-fit" system was easy to integrate with Holley's engine-management system, as well as the Vintage Air system.



The Vintage Air and their new EZClip system was a quick install and is holding A/C pressure, giving us ice cubes out the vents.



The Hooker exhaust system is accented by Heatshield Products DIY muffler shield kits, isolating heat from the cabin on the bottom side. There are more cool tweaks like this all over the car. We'll show you them all soon!



We mounted Holley's Dominator PCM under the dash on the passenger side. It is still in self-learning mode, but the engine idles at 850 rpm with a healthy lope and rumbling exhaust note thanks to Comp Cams, Hooker exhaust, and John Bouchard Engines. Soon, we'll take the Sled to DBR High performance for a chassis dyno session and final shakedown to see what kind of numbers we see at the rear tires. 🏁

→ SOURCES

The Eastwood Company;

800/343-9353; Eastwood.com

Heatshield Products;

800/750-3978; HeatshieldProducts.com

Holley; Holley.com

Painless Performance;

800/423-9696; PainlessPerformance.com

Vintage Air;

800/862-6658; VintageAir.com

HOW TO INSTALL A FIBERGLASS DECKLID

The Flower Car 1971 Dodge Demon, Part VIII

By Douglas R. Glad / Photos: Douglas R. Glad



The days of the vane pump bolted to the back bumper are gone, and we will miss them. Now we have access to in-tank pumps that can feed a lot of power. The Stealth Fuel cell from Aeromotive has an in-tank A1000 pump that can feed a 1,000hp, fuel-injected, forced-induction engine. Also available is the Eliminator pump that can feed a 1,400hp, fuel-injected, forced-induction engine. The tank has built-in baffles that maintain fuel at the pickup point and eliminates problems like cavitation and vapor lock. This is a 15-gallon fuel cell. Aeromotive recommends a voltage control module for cars that run on the street with less than a 10-gallon capacity.

→ **Car Craft** is on year two of this build; if you have been following along, we bought this car in January 2011 as a back-halved roller with a Slant Six and a stock front end. Our plan was to finish the job with a Chassisworks 2x3 front-end kit and an eBay 5.7 Hemi with a set of Comp Turbo 67mm hairdryers and a 392 stroker kit from K1 and Wiseco.

The last major parts we are doing in sections. We have the hot and cold side plumbing on the turbos, wiring, brakes, fuel, and the trunk left on the list. The list might sound short, but it represents several more months of thrashing to get this car on the road. For this story, we prepared the trunk using some old—and new—tricks.



Fuel cell aside, the safety features required by the NHRA are a kill switch that is accessible outside the vehicle, a battery box or hold-down straps, and a firewall between the battery and fuel cell (and the driver). We are also using Dzus fasteners to secure the fiberglass trunklid.



The Dzus fasteners for the trunklid are $\frac{7}{16}$ -inch self-ejecting buttons. They use weld-on tabs, but there are bolt-on versions available.



The positions of the tabs are arbitrary. After speaking with other racers, we determined a total of six fasteners should do the job. After tacking the tabs to the car, we marked the body with the Dzus centerline.



We drilled a $\frac{5}{8}$ -inch hole using a Snap-on hole-cutter kit.



The $\frac{7}{16}$ -inch button is the largest of the five available diameters. Total button length is determined by measuring from the bottom of the spring (in this case, the bottom of the spring slot) to the underside of the head. To get the spring height, subtract the thickness of the material you are fastening; in this case, the fiberglass, plus any additional clearance needed between the head of the button and the tab. There is a recommended deflection for each spring-height and button-length combination. There are reference charts online (we used DzusFasteners.net) to determine the proper fastener for each application.



Using the body mark as a reference, we measured and marked the location of the hole in the trunklid.

The last step was to rivet the spring to the Dzus tab.



The button heads are also riveted to the decklid. Snap-on Tools sells a Dzus fastener tool.



The Stealth fuel cell is designed to be strapped down, but we prefer to use tabs that bolt to the floor. Since this is a new tank, it was OK to TIG-weld the tabs on.



Chassisworks sells a battery box for the group 24 battery, but we wanted to use the smaller and lighter Optima group 51 battery instead. We simply cut the box down and re-welded it to fit. It's the little details that make a street machine cool.

→SOURCES

Glasstek;

630/978-9897; Glasstek.com

Holley Performance Products;

800/465-5391; Holley.com



The Optima 51R battery has the cranking capacity it needs, but saves weight by reducing the storage capacity. That simply means you can't run the fuel pump and fans without the engine running or risk draining the battery.

PARTS

DESCRIPTION	SOURCE	PN	PRICE
Remote mount battery cable kit	Painless	40105	\$281.86
Battery box	Chassisworks	6401	129.00
Yellow Top battery	Optima	8073-167	199.99
Battery disconnect switch	Summit Racing	SUM-G1432	19.95
Dzus fasteners	Chassisworks	8511	3.29 each
Flat Dzus tab	Chassisworks	2323	3.00
Fuel cell	Aeromotive	18660	814.95



The last pieces of the puzzle are the battery disconnect and remote battery cable kit. The concept is to run everything off the switch and nothing off the battery. That way, when the switch is flipped in an emergency, the battery and/or the alternator can't feed the fuse box and power up the ignition or fuel pump. 🛠️

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YEE HAA!

MAN... NOBODY CAN TAKE THIS GUY... HE'S QUICK!

YOUR CAR IS FABULOUS... DO YOU EVER OFFER RIDES?

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OHhhh... WHAT'S THAT SMELL?

LEATHER, MY DEAR... LEATHER!

OHhhhhh I LOVE IT!

THAT WAS WILD!

RUMP RUMP RUMP

OHHH PLEASE... TAKE US FOR A WILD RIDE!

IT'S A ROCK STAR CAR!

YEAH... THAT IS ONE BAD TORINO!

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YEAH... RIGHT HERE IN MY CAR!

OH HHHHHH... THAT'S SOOOO COOL!

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By John McGann and Danny Morris / Photos: John McGann and Danny Morris

TWO WEEKS IN MALIBU

Things Don't Always Go as Planned

The story begins in May 2015; I was home visiting my son, Danny, for his 15th birthday and we were driving around Akron, Ohio, killing time when I saw the Malibu. It was sitting on a used-car lot like a beacon, proudly showing off its rust-free body in a landscape riddled with rusted-out cars less than half the age of this 37-year-old Chevy. I practically flipped my rental car on its lid making a U-turn back to the lot for a closer look.

The Malibu was everything a car from the Rust Belt shouldn't have been, meaning the bottoms of the doors, fenders, rocker panels, and quarters were all intact. Being a Sunday, there was no one to talk with about the car.

Later at Danny's house, the car came up during the family dinner. I described the car, how rare it was for something from this area to be as clean as it was, and how it would be an excellent car for us to work on in **Car Craft**. We joked about how I should buy it and drive it back to California with Danny, who's been out to visit me several times, but always by an airplane. The drive would be a great opportunity for us to spend more time together than we have ever been able to since I left for my job in Los Angeles. The seed was planted.

After Danny got off the school bus the following day, we went back to Akron and talked with a salesman who

told us this was a one-owner car that was traded back in to the dealership in Pennsylvania where it was originally purchased from. That dealership put the Malibu in its showroom and basically stored it for the next decade or so. It had only been driven for 68,000 miles. The \$5,000 selling price was way out of my range, so we left.

The car came up at dinner that night again. People were fascinated by the car's story and my enthusiasm about how nice it would be to have such a clean G-body to work on for **Car Craft**. Ultimately, I headed back to Los Angeles carless. But with the help of some very generous friends, I got fronted enough money to buy the car and told



Car Craft's newest project car, the 1978 Malibu we spotted on the lot at K.O. Motors in Akron, Ohio.



The undercarriage looked promising as well, with just mild surface rust and a lot of undercoating.



We were digging the Landau top and dealer-installed mudflaps. The car only had 68,000 miles and looked to be rust-free, a virtually impossible feat to pull off in northeast Ohio.

the dealer in Akron I'd be back to pick the car up after the **Car Craft** Summer Nationals in July 2015. My idea was to drive the car back to Los Angeles, stopping at various places to install performance products along the way, in a feat I jokingly referred to as the **Car Craft** Tour of Power.

Summit Racing and Trick Flow Specialties were the first to answer the call and even offered to pick the car up ahead of my arrival at the Akron Canton airport. They decided to swap the car's original two-barrel 305 for a Vortec 350 with a Trick Flow Top End kit, dual-plane intake, and a Holley vacuum secondary carburetor, far more generous than I had ever expected. I'd have been more than happy with a set of headers, or maybe wheels and tires.

Since they had the car a couple days before I got to Akron, I asked Bill McGhee—the manager of Auto Dynamics, Trick Flow's in-house install shop—how the car was. He scared me a bit; his text message simply read, "It's ugly."

"Ugly how?" I replied, "Ugly mechanically or ugly rusty?"

"It's just ugly," was all I got back.

For the next two days, I fretted. Did I miss something in my initial inspection of the car? Was it in worse shape than I was able to see?

Danny and I were at Auto Dynamics the day I arrived in town. In person, Bill clarified: "Look at it—its ugly! It's brown!" A wave of calm ran through me; I can fix brown ugly, and brown



Upon our arrival at Auto Dynamics in Tallmadge, Ohio, we were able to inspect the car much more closely. So stock, it's a time capsule of G-bodies of this era.

ugly won't leave us stranded on the side of the road in the middle of nowhere.

Danny's take was a little more charitable: "At first, I thought you were never going to get the car, so I didn't think anything of it when we were looking at it in Akron. It was sweet to see it at Auto Dynamics with the engine out of it."

About its orange-brown exterior: "It's weird looking, but I guess it's OK for the '70s. You should hang a disco ball from the roof." I asked and, thankfully, he doesn't think of me as a product of the 1970s—after all, I was just 6 years old when the car was built and never had the opportunity to don a pair of bellbottom jeans.

Auto Dynamics operates out of the manufacturing facility of Trick Flow Specialties, which, along with Summit Racing, contributed an engine to our Malibu road-tripper. Engine builder Ron Greczarik, a 19-year employee of Trick Flow, walked us through the components. Starting with a Vortec engine block, they added a Scat crank and rods, Sealed Power flat-top pistons, and a hydraulic roller cam with specs of 218/224 degrees duration and 0.500-inch valve lift, ground on a 110-degree lobe-separation angle. To that they added a set of Trick Flow 195 cylinder heads and Trick Flow's dual-plane intake manifold.

With a 10.0:1 compression ratio, this is basically the package Summit and Trick Flow offer as a 400hp, top-end kit for small-block Chevys. Bill McGhee, Auto Dynamics manager, wrangled the parts and Jim Perdue, their technician, installed the engine, which took about three days to get it in the car and hook everything back up. Obviously, we couldn't reuse the car's original two-barrel carburetor, so Summit contributed a vacuum-secondary Holley and also



The original two-barrel 305 was completely original and surprisingly clean.



Our new 350 was built with a Scat and Sealed Power rotating assembly in a Vortec 350 engine block. This engine only had a little dyno time on it and was never installed in a car.



Trick Flow contributed a set of its as-cast, 195cc cylinder heads. With 65cc combustion chambers and flat-top pistons, the compression ratio will be a pump-gas-friendly 10.0:1.



Trick Flow's Ron Greczarik assembled the engine for us, which includes Trick Flow's dual-plane intake manifold, a hydraulic roller cam, and 1.5:1 roller rocker arms.



Summit Racing did its part to be environmentally friendly by keeping the car's original exhaust manifolds and catalyst exhaust system. Remember: Some parts may not be legal for sale in California; I totally respect their decision, and they said they'd understand, too, if a set of headers and a dual-exhaust system were to find its way on the car sometime soon.

supplied the belts, hoses, air cleaner, distributor, plugs, wires, and a new water pump.

Vortec engine blocks still have the cast-in boss for a mechanical fuel pump, but the passages aren't drilled for a fuel-pump pushrod, so we wired in a Holley fuel pump, which is via a relay off the 12-volt, key-on feed to the distributor. We fired the engine late Friday afternoon, and I made a few laps around their industrial park to see how everything ran. Things felt pretty good, so we all went home, and I was eager for our on-time departure for California the next morning.

By the time I got to Danny's house about 15 miles away, it was clear that the brakes weren't working right. The master cylinder was leaking past the rear seal, and the pedal was going to the floor on each stop. I found a replacement Friday evening at an AutoZone in Akron, and it was an easy fix that night. Saturday's mishap, however, would leave us stranded on the road.



Well, that's a bummer. A separating tire and no viable replacements put us on a tow truck just a couple hours into our journey.

Anticipation was high as we set out Saturday. Danny and I hit the road after a big breakfast and an extended goodbye with the family. The car felt good as we pulled onto I-76 heading west. The brakes were solid, the engine sounded good, and we had the windows down heading west. About 120 miles down the road, I noticed the gas gauge hadn't budged since the day before. I stopped at the next exit and pumped nearly 14 gallons into the car's 18-gallon tank that our gas gauge was telling us was half full. "No worries," I explained to Danny, "the speedometer and odometer are working. We know how much the tank holds, and the next time we fill up, we'll know about how many miles per gallon the car is getting, so we can figure a safe range to travel between fill-ups."

As we left the gas station, my girlfriend called. "Everything is good. The car is running well. We're having a great time." I hadn't even finished saying those words when the car started to vibrate. It wasn't too noticeable at first, but the vibrating was gaining in intensity to the point that the whole car began to shake. I pulled off at the next exit. Ironically, there was a Costco there, which was a relief, because I suspected a tire was going flat. In the parking lot, I discovered a bulge forming in the center of the tread on the right rear tire, indicating that the tread was separating from the rest of the tire. Neither Costco, nor any of the other tire stores in the area had any 195/45R-14 tires in stock. Of course, the space-saver spare in the trunk was flat. Someone at the tire store filled it up for me, but when I used the stock bumper jack to lift the car up, it began to pull the bumper off the mount.

At that point, I pulled the plug and called AAA. In addition to the tire problem, the engine was flooding each time I tried to start it. A flatbed tow truck hauled us back to Auto Dynamics in Tallmadge, Ohio, and Danny's uncle and

cousin took us back to their house.

Looking over the car that night, I decided to replace all the tires. Though they looked OK, I realized they'd probably been on the car the whole time it was in storage. If one had started to come apart on us less than two hours into the trip, the rest were soon to follow. I also decided to replace the radiator, which looked like it was moments away from springing a leak. We went back to AutoZone for a new radiator and Walmart for a set of inexpensive tires.

I took the car back to Auto Dynamics Monday morning, where we adjusted the carburetor, and at that point we felt brave enough to venture back onto the freeway—a few days late, but still bound for Los Angeles. "I hope we make it farther than Columbus this time," Danny and I said, nearly in unison. It was a relief when we reached the Ohio/Illinois border. The car was doing OK.



At Danny's family's house, I gave the car a more thorough inspection and ended up replacing the master cylinder and radiator. I had four new tires installed the next Monday, and we hit the road again.

With the new tires, and a bit more carburetor tuning, we made it out of Ohio, at least. Next stop: Terre Haute, Indiana.



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The entrance to VP Racing Fuels' Terre Haute, Indiana, distribution center looks as if it was made for patriotic photo shoots.



Imagine having all this race gas at your disposal!



Jason Rueckert's 1982 Oldsmobile has a 588ci big-block built by Steve Schmidt, twin 98mm Precision Pro Mod turbochargers, a Mark Mickey TH400, Menscer Motorsports shocks, and a chassis built by Pro Tree Race Cars. He runs 4.30s on Mickey Thompson 315 drag radials.

Below: As we were leaving Terre Haute, Indiana, we tried stopping for dinner at Homey's barbecue restaurant, but were disappointed to find it closed. We ended up at a Subway instead. If you've been to Homey's, email us at CarCraft@CarCraft.com and tell us what we missed! It's gotta be good, right?



We made it to Terre Haute, Indiana, with no problems and made our way to the Midwest Distribution center for VP Racing Fuels, where we met with friend and G-body owner Jason Rueckert. VP's Terra Haute center moves about 100,000 gallons of fuel per month during the busy season and about 1.3 million gallons per year. Fuel comes to them from VP's refinery in Texas by the pail, drum, semi trailers, or colossal 29,000-gallon train cars. They also move ethanol-free, small-engine fuel and VP's new line of lubricants.

I planned to shoot some pictures of Jason's Oldsmobile after he was done with work, so Danny and I checked out some of the sights in Terre Haute, including a cemetery with grave markers dating back to the Civil War.

That evening at Jason's house, we readjusted the carburetor floats. The front float was sticking, causing a geyser of fuel to shoot out of the bowl vent each time the fuel pump was activated.

Jason's Oldsmobile is a stellar machine that he races in Radial vs. The World and Pro Drag Radial classes. It's Jason's first car; he bought it in high school. Powered by a twin-turbo big-block, he still calls it the Slowsmobile.

After the shoot, Danny and I hit the road for Chicago to visit Schwartz Performance, manufacturers of tube chassis for a wide variety of muscle cars, including the G-body.



Jason Rueckert, John Mellon, and me.



There were a lot of really interesting builds happening at Schwartz Performance, headquartered in Woodstock, Illinois. This is just one of several other rooms on their property, and they all were filled with stuff like this.

The next day's adventure took us to Schwartz Performance in Woodstock, Illinois. We arrived around 11 a.m., and Dale Schwartz, son of owner Jeff Schwartz, gave us the tour. Known for their made-from-scratch tube chassis, the business is much more than a frame shop. They repair and maintain high-end exotics, finish off ill-fated repairs other shops started, and do ground-up builds for customers all over the world.

Dale asked one of the technicians to roll out one of their G-body chassis for us to check out, and the thing is a work of art. The design for one of their chassis begins by taking dimensions and making fixtures from a stock frame, then improving the stock design for more strength, rigidity, and better suspension geometry. This design is turned into a CNC program, which is sent to a local tubing-bending company. The tube is all mandrel bent and



Dale rolled out one of the company's G-body frames for us. You can see the quality of the welds, the adjustability built in to the suspension mounting points, and reinforcements in critical sections of the frame. We're not sure if our project Malibu will reach the level of performance that will require an aftermarket chassis, but if it does, Dale will be the first to get a phone call.



Check out the difference between a stock frame and one from Schwartz Performance. They are stronger, lighter, offer more room for wide tires, and have better suspension geometry.

delivered to Schwartz Performance, where the components are welded together by hand. "Stock frames are usually heavier than they need to be in certain areas, and too light in others," Dale explained. "We fix those issues, and in the process, we typically offer about a 150-pound weight savings over the stock frame." That is obviously good for weight distribution and weight transfer while driving, no matter which type of motorsports you're into. Though their chassis are expensive, Dale explained that though you can make a stock car handle and perform well with bolt-on parts, they are ultimately a Band-Aid, and at some point, a person who is competing in motorsports will ultimately be hindered by the inherent lack of strength of a car's stock frame (or unibody—Schwartz makes chassis for Mopars and Fords) and will need to stiffen and reinforce the frame, or get rid of it all together. Spending more money from the start can ultimately save their customers money later as the build evolves.

After drooling over some really nice hardware at Schwartz Performance, Danny and I hit the road for St. Louis and the Gateway Arch, something we both wanted to see. We made it to St. Louis that evening only to be turned away from our first three hotel choices because they were all full. We ended up in a sketchy motel where the front-desk people cracked jokes about using my credit card to buy themselves groceries. Funny, right?

The Gateway Arch was far more interesting than either of us imagined; Danny and I scraped the money together to ride the tram to the top of the arch and were treated to breathtaking views of St. Louis and the Mississippi River. The tram itself is an engineering marvel—you ride up in these little tram cars that look like aspirin tablets turned on edge, and the cars rotate to stay upright as they ascend and descend the legs of the arch. It was fascinating.



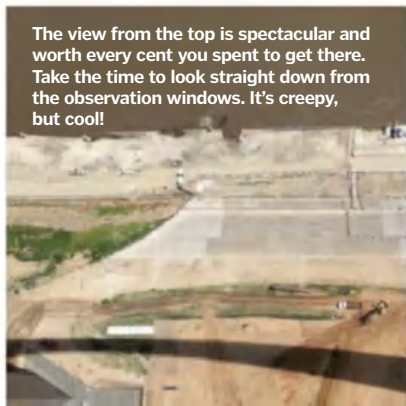
The next day's adventures took us to the top of the Gateway Arch in St. Louis, an engineering marvel that was built in the 1960s.



You can take a tram to the top of the arch, 630 feet above ground level. The tram is a series of tiny cars that fit five people uncomfortably. Round like aspirin tablets, they ratchet to remain upright while ascending and descending the legs of the arch.



The view from the top is spectacular and worth every cent you spent to get there. Take the time to look straight down from the observation windows. It's creepy, but cool!



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Big thanks go to John "Baron" Gentry for offering his garage and tools to yet another of our roadside repairs. We dropped in a lower-temperature thermostat at his house. Regular readers should recognize his 1984 Cutlass from our recent articles on Discovery's *Street Outlaws*.

Back on the ground after our trip to the top of the Gateway Arch, Danny and I continued our westward trek, a journey that became increasingly fraught with problems. We made it to Springfield, Missouri, that night and spent the following morning exploring Springfield's Bass Pro Shops. Danny loves to fish, and I've never been inside one of those stores, though I've heard all about them. Still, the spectacle was impressive. We lingered over tanks of fish, turtles, and even alligators, scoped out some bait and lures, and joked about possibly needing some of the camping gear in case things went south with the car.

Out in the parking lot, the Malibu mocked us by dumping what looked like two pints of coolant on the asphalt. I quickly traced the source of the leak to a rubber plug blocking off an unused port in the passenger-side radiator tank of the supposedly direct-fit radiator I had replaced just days earlier. The cheap hose clamp chewed a hole in the cheap rubber plug blocking the port. I repositioned the plug, and we limped to a parts store, fortunately located just two blocks away, where I bought better-quality block-off plugs and clamps. We continued on to Oklahoma.

To be honest, the engine always ran hotter than I felt was right. For the next few hours, I pondered possible causes and solutions: was the thermostat stuck or slow to operate? Was the timing too retarded? I had lofty plans of visiting Don Dial's Race Shop in Seminole, Oklahoma, along with Midwest Street Cars, where I'd try to install a performance part or two on the Malibu. Those plans began to shift to something more along the lines of self-preservation, and I planned instead to replace the thermostat and double-check the timing and carburetor settings wherever we stopped.

Most of my Oklahoma City connections were not home the next day, but

John "Baron" Gentry was and offered up his garage and tools to our cause. He even picked up the thermostat for us while we were on our way to his house. We dropped in a 160-degree thermostat and got back on the road. Destination: Gallup, New Mexico, and on to the Four Corners Monument.



Oklahoma and Texas were the states we spent the most time traveling on Historic Route 66, which rewards you with iconic imagery, long-abandoned roadside relics, and a more relaxed pace than the Interstate. It's easy to imagine Model A Fords rolling along these historic slabs of concrete carrying people with dreams of relocating to a new life in the west. Were we not on a more compressed time schedule, I'd have taken Route 66 as much as possible for the remainder of our trip.




We drove through the top of Texas quickly and spent the night in Tucumcari, New Mexico, leaving early the next morning for Gallup and the Four Corners National Monument.

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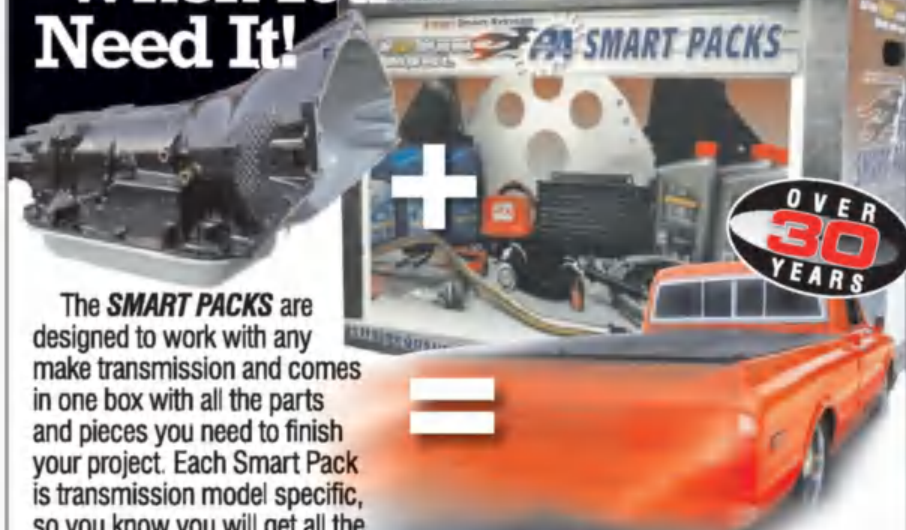
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My concerns growing, we stopped at a parts store to buy a spark-plug socket and checked the plugs. The oily buildup and deposits weren't encouraging.

It's only fitting that a road trip that begins on the back of a flatbed tow truck, ends in a similar manner. This time, however, we outdid ourselves, as it took two tow trucks and a friend's trailer to get our ill-fated Malibu to its final destination.

As mentioned previously, I was suspicious of the engine for most of the trip; it always seemed to run hotter than it should. Nothing I did helped—new radiator, new thermostat, and ignition

timing and carburetor adjustments—none of these seemed to reduce under-hood temperatures, which were so high, you couldn't touch anything under the hood, even after just a short time driving. Things really fell apart on the last leg of our trip, when a blown head gasket boiled a massive amount of coolant out of the 'Bu's overflow reservoir, leaving us stranded in the desert outside of Needles, California. I was pulling my AAA card out of my wallet before we made it to the side of the road. The desert isn't a place to screw around. Out of money, I had just enough mileage left in my AAA Premium membership to have the car towed to Westech Performance Group in Mira Loma, California, approximately 140 miles from where we were. As ignominious as it was sitting on the side of I-40 waiting for a tow truck was, the ride to Westech felt even more humiliating as the first tow-truck driver took us as far as Bakersfield, then handed us off to another guy who hauled us the remainder of the distance to Mira Loma. "We made it to California, at least!" Danny and I joked, but it was only a small consolation.

Steve and the crew at Westech did a preliminary diagnosis and determined the Malibu had suffered a head-gasket failure. *Vette* Magazine's Steven Rupp then trailered the car to our tech center in Santa Ana, where the car remains until one of us has time to fix it.

At first, I beat myself up quite a bit for leaving my son and I stranded in the desert, but that was shortsighted. Really, it was the trip of a lifetime. We got to meet new friends, catch up with old ones, and see the majestic beauty our country has to offer if you take the time to look. Even more important than all that was the amount of time my son and I got to spend time with each other, and you can't put a price on that. Even after we finally made it to Los Angeles, Danny and I both agreed we'd make the trip again. Next time, we will cheat, however, by driving a car with a better-functioning cooling system. As for the Malibu, well, it did deliver us to California and everything that went wrong is fixable. It's a G-body, so tons of parts are available for it. I have visions of making it a hot, street sleeper disguised in a plain, beige wrapper. Stay tuned, the saga never ends.



We made it to Gallup, but only stopped for fuel. It was too late in the day to make it to the Four Corners Monument before closing time, so we decided to spend the night in Farmington. Heading north on U.S. 491 (formerly U.S. 666), we managed to dodge a nasty-looking thunderstorm along the way.



The Four Corners Monument is the one place in the country where you can stand in four states at one time. It's where the borders of Colorado, New Mexico, Arizona, and Utah meet, and people line up to have their pictures taken on the marker where all four states meet.



It was cool to see Shiprock on the Navajo Nation. The rock formation cuts an imposing figure in the mostly flat landscape; its peak rises nearly 1,800 feet above the surrounding landscape and can be seen for miles.

The road leading from the Four Corners to the Grand Canyon, U.S. 160, is a lonely one, but the scenery is stunning.





The splendor of the Grand Canyon evades description, and pictures don't do it justice, either. I had visited the Grand Canyon nearly 20 years ago, and it was even better than I remembered. Danny and I stopped at all the lookout points along the South Rim, each offering its own majestic view. I figured out how to use my iPhone's panorama function just in time to take advantage of it here.



On the way out of the park, we spotted an elk grazing at the side of the road. More picture-taking ensued before we headed south for an overnight stay in Kingman.

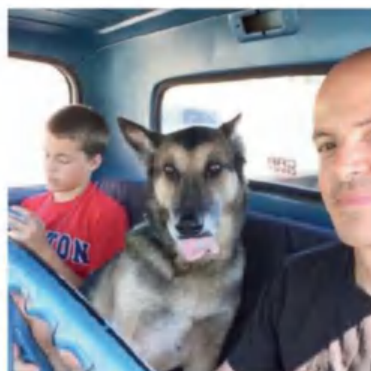


“About 20 minutes past Needles, California, I started to smell coolant.”

Full of optimism, we left our hotel the next morning, expecting to be back in Los Angeles in time for dinner. Fate, however, had different plans for us. About 20 minutes past Needles, California, I started to smell coolant. The engine lost power and then began to detonate. I pulled to the side of the freeway immediately, mumbling something to Danny about our trip ending here. Coolant in the overflow reservoir was bubbling like a percolator coffee pot, and a stream of coolant traced a path behind our car as far as I could see. My AAA card was already in my hand; I grabbed my phone and dialed.



Fortunately, I had cell reception. I also had the foresight to buy a few extra bottles of water to keep us hydrated in the 100-degree heat waiting for the tow truck. A semi wrecker came to our aid. He took us as far as Barstow, where we were passed off to the flatbed that would serve as our conveyance to Westech. A friend drove us home from there.



Truck Norris, my 1967 C10 didn't let us down, and my dog was happy to see me again after being gone for so long. Danny promptly nicknamed the C10 “The Truck of Death.”



I also managed to borrow a SRT Challenger Hellcat from Chrysler's press fleet. That more than made up for the trials of the proceeding week. Meanwhile, the Malibu has sat in our Santa Ana office since Westech's preliminary diagnosis of a blown head gasket. Read about our findings and how we fixed it soon.

MIDNIGHT DRAGS



This is Chris Bishir's first drag car. He bought it when he was 19 years old and had been swapping nitrous engines in and out of it for years before settling on a turbo LS. The transmission is a Powerglide and the rearend is a Ford 9-inch with 3.50:1 gears.

GHT 2015

Presented by:

GV GEAR VENDORS
UNDER/OVERDRIVE

By Douglas Glad /
Photos: Dominick Damato

What are we talking about? The Midnight Drags presented by Gear Vendors is a heads-up street-tire shootout that starts after the **Car Craft** Summer Nationals ends in West Allis, Wisconsin. It's grudge racing, so the pairings are completely random for the first round, then the survivors are divided by slow and fast and asked to draw poker chips for single eliminations. The winner gets \$1,000, a **Car Craft** jacket, and a place in the magazine. This year, we had two low-9-second cars in the final, with Chris Bishir walking away from Jim Schmittinger's 1987 Buick Grand National to take the money. Here are the quick eight. See the Midnight Drags in person next year after the **Car Craft** Summer Nationals.



Chris Bishir is a technician for Lingenfelter Engineering in Decatur, Indiana, so tuning high-horsepower street cars is a regular job for him. He's also been racing since he was 16 years old and has a solid handle on this 1982 S-10 truck. In the final, he clicked off a 9.07 at 153 mph when it counted.



The current setup is a 5.3L from a 2005 Avalanche with twin S366 BorgWarner 66mm turbochargers. The manifold is an Edelbrock Pro Flow that was converted to 16 injector ports and drive-by-wire. Boost is ramped in by the Holley Dominator ECU, for a total of 29 pounds. The truck has been 8.41 at 163 mph, making it too fast for the 'cage.



When we saw Greg Edward's 1967 Camaro pull up into the tech area, we didn't expect him to sign up for the Midnight Drags. The Camaro looks like a nice 11-second street/strip car. We were wrong.

If you think this car is slow, don't bet any money. Greg's car ran a 9.40 in round 2 and, had it not fouled at the light, would have beaten the runner-up Buick Grand National.



This Chevelle started as a back-half roller in 2007. Tony Jarrell stripped it down and rebuilt it as a fast street machine and began cruising and drag racing at the Dragaway. He thinks the car might have been raced at U.S. 41 and the legendary Doty road in Chicago.



The combo is a simple 555-inch big-block on nitrous. Goes fast, looks great.



The Chevelle's engine is a Merlin 540 with 14:1 compression, Merlin heads, a huge solid roller cam, and a Dart intake. The carb was dialed for E85 by Quick Fuel. The transmission is a TH400, and the rear is a 9-inch with 4:30:1 gears. It makes about 840 at the wheels. Leaving off the foot brake, it has covered the 60 foot in 1.33 seconds. The Chevelle ran a 9.94 at 132, but lost in the semifinal round to Jim Schmittinger's Buick.

Jarrell heard about the Midnight Drags while he was attending the 2015 Car Craft Summer Nationals in nearby West Allis, Wisconsin. Even though his 1966 Chevelle is radical enough to runs 9s on the motor in a heavy car, he still drives the car to shows in the area and as far as the Blue Top Drive-In in Highland, Indiana.



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In round 2, Adam drew Bishir's number and ran a 10.16 to the S-10's 9.71.



Adam Hodson competed at the 2014 Midnight Drags when it was held at the I-57 Dragstrip in Benton, Illinois. The car has a 5.3L LS from a 2005 Silverado with a 75mm BorgWarner turbo. It was fast, running 6.93 in the eighth-mile (high-10s in the quarter), but he drew previous winner Mitch Leidecker's Mustang in the first round and went out.



For 2015, Adam added a Holley intake manifold with 120-pound injectors and new throttle-body in the place of the stock truck parts. The car picked up almost a half-second over last years' performance.



Competitor Jim Schmittinger had two cars entered in the Midnight Drags: this 1987 Buick Grand National and a 2015 Hellcat. The Buick went all the way to the final round with a string of low-10-second runs.



The simple-but-deadly combo in the BGN is a 406-inch Chevy small-block with SB2 heads and a monster 106mm turbocharger.

Jim Ransom came down from Oconomowoc, Wisconsin, in his big-block-powered 1968 Nova. He ran a 10.45 at 127 to get into round 2, only to lose to the Hellcat by 0.01 second. It was the closest race of the night.



Jim Schmittinger's other entry was this 2015 Dodge Challenger Hellcat driven by his friend, Matt Winklweier, from West Allis. As of this writing, this is the second fastest Hellcat in the nation (there is a Hellcat running 10.20s out there).





The Hellcat has only a lower pulley swap from ATI, an E85 tune, a one-piece driveshaft for safety, and P305/25R20 Mickey Thompson ET Drag Radials. It ran 10.50s all night, then lost to Bishir on a holeshot.

CAR CRAFT MIDNIGHT DRAGS 2015

PRESENTED BY:
GV GEAR VENDORS
UNDEROVERDRIVE



The combo is traditional 434-inch Dart Iron Eagle small-block with Pro Topline 245 heads, a Brodix HV1003 intake, and a King Demon 1090 carb. There is a nitrous plate on the engine, but Brian ran the car without for the drags.

Brian Stockinger heard about the Midnight Drags at the Car Craft Summer Nationals while working as the sponsor of the West Bend Dyno Tuning dyno at the show.



This was a shakedown run for the car, but it still ran 10.89 off the foot brake. The TH400 has a transbrake as well, but when Brian left on it in round 2, the tires went up in smoke. He plans on making it back next year with the nitrous ready to go. 🏁

By Evan Perkins /
Photos: Dominick Damato, Robert McGaffin, and Evan Perkins

CAR CRAFT

REAL STREET ELIMINATOR PRO/AM



With 675 hp on tap from a Schwartz-built LS7, Adam Koch's 1969 Camaro SS/RS is a handful.



All entries competed on the QA1 Autocross.

Put Up or Shut Up

How do you prove your ride is the baddest machine with a license plate? Easy, run it in the **Car Craft** Real Street Eliminator Pro/Am. The challenge pits vehicles against the clocks on the QA1 Autocross, road course, and the Speed Stop—a unique test of handling and braking prowess. In years past, the RSE had been structured around single competitors all vying for the win. This year, the formula was revamped into a team dynamic with the intention of bringing manufacturers or shop owners (the pros) together with enthusiasts (the amateurs).

Hence, the Pro/Am was born.

To level the playing field between old- and new-school tech, the event was divided into two categories. The first included American rear-wheel-drive vehicles built prior to 1982, while the second featured American rear-wheel-drive vehicles built from 1982 to the current model year. All cars were restricted to 200-treadwear tires and all entrants had to prove their vehicle was street-legal, registered, and insured. After all, the goal was to prove who had the fastest street machine—no race cars here.

CATEGORY 1 (POST-1982)



TEAM	Schwartz
PRO	Jeff Schwartz
VEHICLE	2016 Corvette Z06
ENGINE	Stock LT4
SUSPENSION	Stock with Schwartz Performance alignment, Forgeline GA1R wheels
AMATEUR	Dan Howe
VEHICLE	1986 El Camino
ENGINE	LS engine with 515 hp
SUSPENSION	Schwartz Performance G-Machine Chassis, triangulated four-link, Moser full-floating 9-inch with 3.50:1 gears, Ridetech coilovers, Baer brakes and BFG Rival tires



TEAM	Viking Performance
PRO	Damion Campbell
VEHICLE	2001 Corvette
ENGINE	LS3 swap with Texas Speed camshaft and FAST LSX intake (498 hp)
SUSPENSION	Viking Performance double-adjustable coilovers, brakes from a C6 Z06
AMATEUR	Brad Smith
VEHICLE	1997 S-10 Pickup
ENGINE	1999 LS1 swap with heads, cam, and Stainless Works long-tube headers made 435 hp to the tire
SUSPENSION	Viking double-adjustable shocks, 18x9.5-inch Boss wheels and 275/35 BFGoodrich Rival tires on all four corners, C5 Corvette front brakes, disc conversion in rear, UMI upper and lower front control arms, Hotchkis front and rear sway bars, modified drop-leaf in the rear

CATEGORY 2 (PRE-1982)



TEAM	Schwartz 2
PRO	Dale Schwartz
VEHICLE	1965 Pontiac Tempest
ENGINE	Schwartz-built LS3 (520hp estimate)
SUSPENSION	Schwartz G-Machine chassis, 14-inch Baer Brakes, BFGoodrich Rival tires mounted on 18x9.5-inch front and 18x12.5-inch rear XXR wheels
AMATEUR	Adam Koch
VEHICLE	1969 Camaro SS/RS
ENGINE	Schwartz Performance-built LS7 675 hp, factory LS7 dry sump
SUSPENSION	Ridetech coilovers, four-link rear with Moser M9 housing, Billet Specialties wheels 8-inch front and 11-inch rear with BFGoodrich tires



TEAM	West Bend Dyno Tuning
PRO	Dennis Prunty
VEHICLE	1980 Trans Am
ENGINE	Lysholm Supercharged 416ci LS on E85
SUSPENSION	Afco double-adjustable shocks, Wilwood disc brakes, 18x10-inch front and 18x12-inch rear Formula 43 wheels with BFGoodrich Rival Tires, Heidts Pro G suspension.
AMATEUR	Al Robertson
VEHICLE	1971 C10 pickup
ENGINE	Stock bottom end 350 with Dart heads, Comp roller cam, and Holley Carb
SUSPENSION	CPP springs and shocks, custom aluminum bed frame, aftermarket aluminum wheels

CATEGORY 1 WINNER: SCHWARTZ PERFORMANCE

The winning team in Category 1, for the first ever RSE Pro/Am was the pairing of Jeff Schwartz (the pro) and Dan Howe (the amateur). Jeff, the owner of Schwartz Performance helped Dan set up his 1986 El Camino with a Schwartz Performance G-machine chassis and dial it all in to perfection. The Elky was put together by Dan and his son and makes a serious 512 hp to the tires.

Dan Howe's G-body rocks a Schwartz Performance G-Machine chassis and powerful LS engine

Jeff posted the fastest time on the QA1 Autocross (30.183 seconds) and also on the Speed Stop (4.555 seconds). Dan held his own on the autocross, but the El Camino struggled to hunker down on the Speed Stop Challenge, posting the slowest time (5.395). It was the team's stellar performance on the road-course section that clinched ultimate victory.



CATEGORY 2 WINNER: SCHWARTZ PERFORMANCE 2

Like father, like son—the team of Dale Schwartz (the pro) and Adam Koch (the amateur) took home the Category 2 win. Dale's Tempest laid down the third fastest autocross time of the event, and he and Adam were near the top of the pack during the road-course segment despite both being in



1960s muscle cars. The cars struggled a bit putting the reins on their combined 1,196 hp during the Speed Stop, but put up a combined total time from all three events to nab the win in the pre-1982 category.



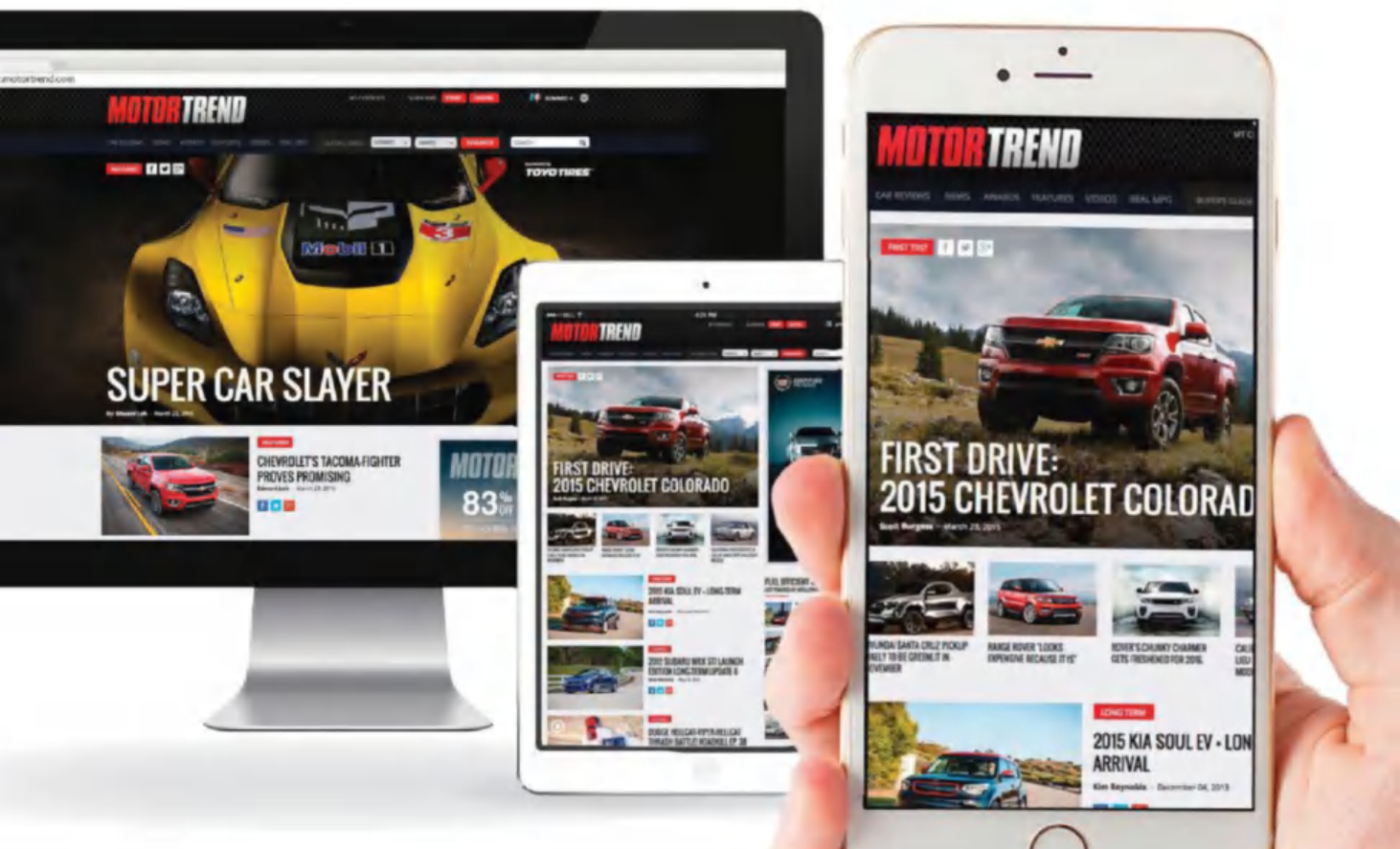
CATEGORY 1 RUNNER-UP: VIKING PERFORMANCE

The runner-up team in Category 1 was the pairing of Damion Campbell and Brad Smith. Damion, in his modified 2001 Corvette, took the helm as the pro driver on behalf of Viking Performance and was hot on the tail of the Schwartz team all weekend long. Damion's Corvette snagged the second fastest Speed Stop time, but couldn't quite navigate the course as lithely as the newer Z06 sibling of Schwartz.



Brad Smith, the amateur half of the team, brought out an extremely competent S-10 that had been swapped with an LS1 and T56 out of an F-body. The little truck was a force to be reckoned with, as it hung right with the pack in the autocross, but the Speed Stop and road-course sections proved to be a struggle for the pickup.

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The 1980 Trans Am of team West Bend Dyno Tuning was hot on the heels of the leaders. The powerful Pontiac was only half a second behind the Z06 of the Schwartz team on the road course.

CATEGORY 2 RUNNER-UP: WEST BEND DYN0 TUNING

The West Bend Dyno Tuning team of Dennis Prunty and Al Robertson was made up of two polar-opposite rides. The 1980 Trans driven by Dennis and owned by Brad Riekkoff is a fully built monster machine packing a 1,000hp, 3.3L, Lysholm-supercharged, 416-cube LS on E85 and new-age Pro Touring suspension.

The C10 longbed fielded by Al Robertson in the amateur portion couldn't have been more grassroots. The truck has a humble small-block Chevy with Dart heads and a Comp roller cam. The suspension is mostly stock, with upgraded



Dennis Prunty wowed the crowd with consecutive sideways slides into the Speed Stop finish.



Damion Campbell's Corvette made use of some braking components from a later-model Z06 and puts 498 hp to the tire from a warmed-over LS3.



The 2016 Z06 Corvette of Jeff Schwartz cleaned house on the autocross course, scouring the weekend's lowest time of 30.183 seconds.



Under the hood of the 1980 Pontiac lived a West Bend Dyno-tuned, 416ci LS. With some help from the Lysholm supercharger and a healthy diet of E85 fuel, it cranks out more than 1,000 hp.



Brad Smith's S-10 proved to be a fierce autocrosser. Its F-body donated driveline and Viking Performance shocks allowed the little pickup to hold its own.



The 1965 Pontiac Tempest of Dale Schwartz proved its old iron still had plenty of fight in it, checking in only a few tenths behind his pop's unworldly Z06 in the autocross.

Al Robertson's C10 was by far the most grassroots-oriented RSE competitor, but that didn't stop the budget-built racer from tearing it up in the autocross.

springs and shocks from CPP. The bed features a custom aluminum frame built by Al.

The team put up a noble effort with the C10 wowing spectators in the autocross and the Trans Am orchestrating several smoky, sideways slides into the Speed Stop finish that had the spectators going wild. Dennis ran the Pontiac hard, grabbing the second-fastest road-course and autocross time, but the combined times of the Pro/Am combination found them just more than 2 seconds behind the team of Dale Schwartz and Adam Koch.

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WTF? (Where's The Fun?)

MANUAL LABOR IS LABORIOUS, RIGHT?

Who: Sean Russell

Where: Blaine, WA

What: 1967 Ford Mustang Fastback

Why: When Sean got the ponycar back in 2000, he later sold it. But then he bought it back. He—and sometimes with buddies—has been doing most of the work, including the metal-work, cut/buff (“a huge pain in the ass—I guess that’s why it

costs so much”), and more. Under the hood is a 351W with iron GT40 heads, a Performer RPM intake, and Holley 750 double-pumper with mechanical secondaries. There’s also a pushrod suspension at the rear and coilovers up front and a Ford Top Loader trans, among the changes head to toe and top to bottom. Sean is planning for it to be up and ready for shows by the winter.



THE FUN CRUISER

Who: Brad Krekelberg

Where: Shakopee, MN

What: 1979 Mercury Zephyr

Why: Brad told us he’s making the Zephyr into a “fun cruiser.” The definition of that? “It has a 1990 SEFI H.O. Mustang engine with Explorer GT40P top end, a T5 trans, and an 8.8 with 4.10 gears.” He also added through-floor subframe



connectors, a strut-tower brace, tubular K-member, H&R Sport springs, and Tokico HP dampeners. Additionally, it has five-lug four-wheel discs with 2001 PBR calipers at the front and Mark VII brake setup at the rear. The SVO rims are wrapped in Continental rubber. “I’ve also enjoyed raiding the factory Fox and SN95 parts bins for performance and comfort goodies as well as the massive Fox-body aftermarket.”

IN THE NEWS



Photography: PRNewsFoto/
Schon Productions, ABC4Utah

JOURNEY + MARIO ANDRETTI = TOOK LONG ENOUGH

It's a bit anticlimactic since the 1980s are over, but we still liked the idea of Neal Schon, guitarist and songwriter from the band Journey, meeting up with racer Mario Andretti. They went for a ride in a Honda. A Honda, as if it could get more anticlimactic. Still. It's Journey and Andretti. Or whatever the kids combo people as these days, like Andrettney.

GM'S GOT A NATIONAL HISTORIC LANDMARK

If you head over to GM's Tech Center in Warren, Michigan, you might spot a new appendage: a 5-foot-tall marker symbolizing the center's new status update of National Historic Landmark. You might think it got this for being around forever and a day, and that's only part of it. When it was birthed in 1956, it was massively advanced in design and engineering, and was a creation of a famous architect named Eero Saarinen.



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The Dodge Viper GTC Customizer gives you a chance to über-customize a virtual-reality version of a Viper with your own design. More than 25 million build combos are possible, thanks to 24,000 custom stripe colors, 16 interior trims, 8,000 exterior colors, and so on. And Dodge will give a complimentary Viper speed form replica to buyers so that they can see their Viper's colors before it's built. There's even a way to put the Viper in "life-style environments" to see how their unique Viper GTC will look at what we're guessing will most popularly be at the local library. Check it out at Drivesrt.com/viper.



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BLOWN-UP PARTS



"My car is a 1994 Mustang with a 460 out of my dad's old truck. It's got a mild 246 at 0.050 cam, a Port-o-Sonic intake, and Hooker headers. My trans is a Top Loader from a 1965 Galaxy. Anyway, 4.30 gears and 28x10.5 slicks were too much for the stock axles. I haven't been able to make a good pass yet, but it ran 112.75 mph with the 3.27 gears at 3,550 pounds." —unotme88 via email



COVER-CAR WANNABE

Who: Steve Cammick

Where: Port Charlotte, FL

What: 1967 Ford Mustang

Why: Steve's homebuilt ponycar allowed him to meet 12.2 at 112 mph with a 5.0L. Then he dropped in a 427 Windsor and saw 11.2, "with nothing but the motor. Then they asked me to leave and not come back without a rollcage."

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disclaimer: If you can't write a complete sentence, don't worry, we will make your work comprehensible. That includes making up stuff we thought you meant.

→LETTERS

THAT'S LIKE GETTING TIRED OF PIZZA

In the Nov. 2015 issue's Shop Talk, you mentioned diversity of people at shows and wondered where all the turbo guys were? Then you mentioned the easy and affordable LS turbo, thanks to modern technology, and with that said, why not do a junkyard turbo on older engines for those of us who are tired of seeing everything with an LS in it? Small-block Chevys, Fords, and Dodges all can be found in salvage yards across the country, some even still have big-blocks there. The LS and Mod motors may be considered to be modern marvels, but don't you guys get tired of writing about them?

—Kacy Hicks, via email

We're on the same page, because we've been trolling the junkyards this month in search of just that.

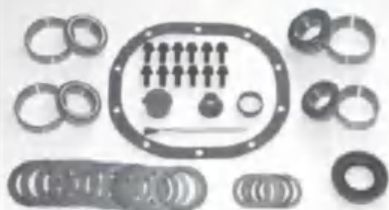
BURNOUT!!



Leaving work in my 1953 Bel-Air. I've been driving it for three years since buying it from the original owner's wife after it sat in a barn since 1957. The original, stock 235 overheated and seized up a couple weeks after this picture was taken."

—Brenton Becerra, via email

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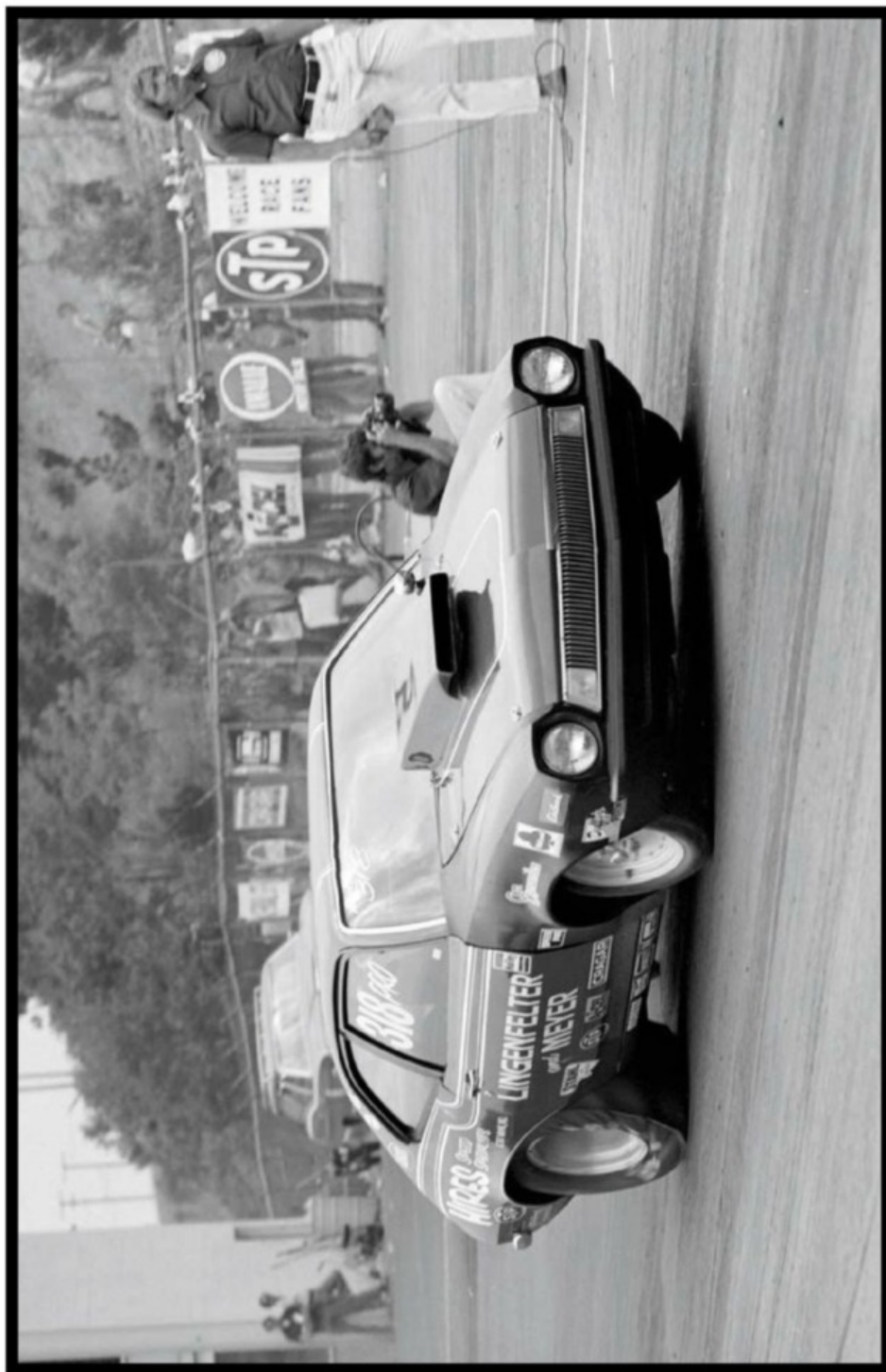
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REAR VIEW



POTENT PONY

Some names become associated with specific marques. John Lingenfelter is probably most remembered for his super-high-performance tuning of Corvettes, Camaros, and other GM products. Long before maxing out production street vehicles, Lingenfelter was testing his tuning chops on the quarter-mile. While paired with Mike Meyer in 1974, they fielded a 366-powered Pro Stock Pinto, captured here at the NHRA Spring Nationals. The fiberglass-nosed Pinto would run low-9s and had a best of 9.149. Lingenfelter took over a dozen NHRA titles in three different classes, but none with his potent Pinto. Lingenfelter passed away in 2003, but his sizable performance legacy still lives on at Lingenfelter Performance Engineering (LPE).

By Thomas Voehringer / Photo: Jon Asher

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